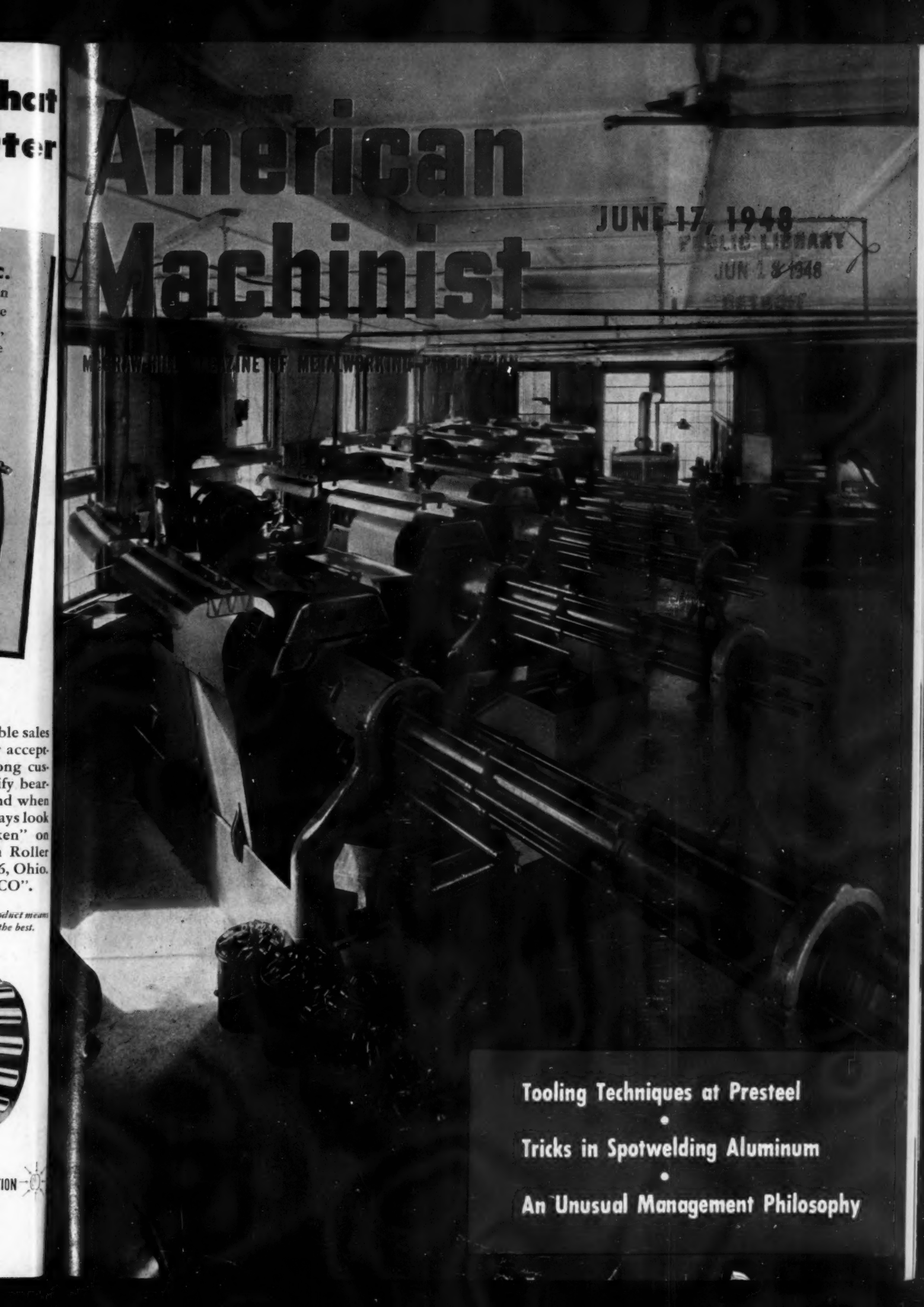
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Tooling Techniques at Presteel
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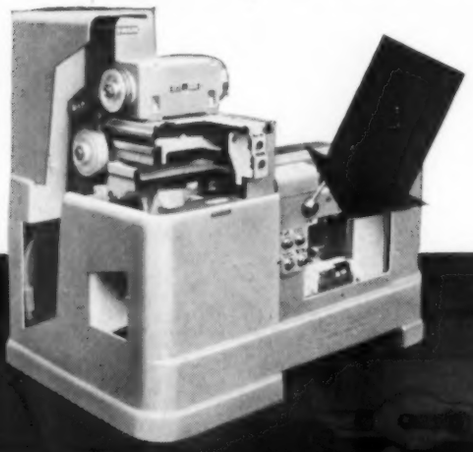
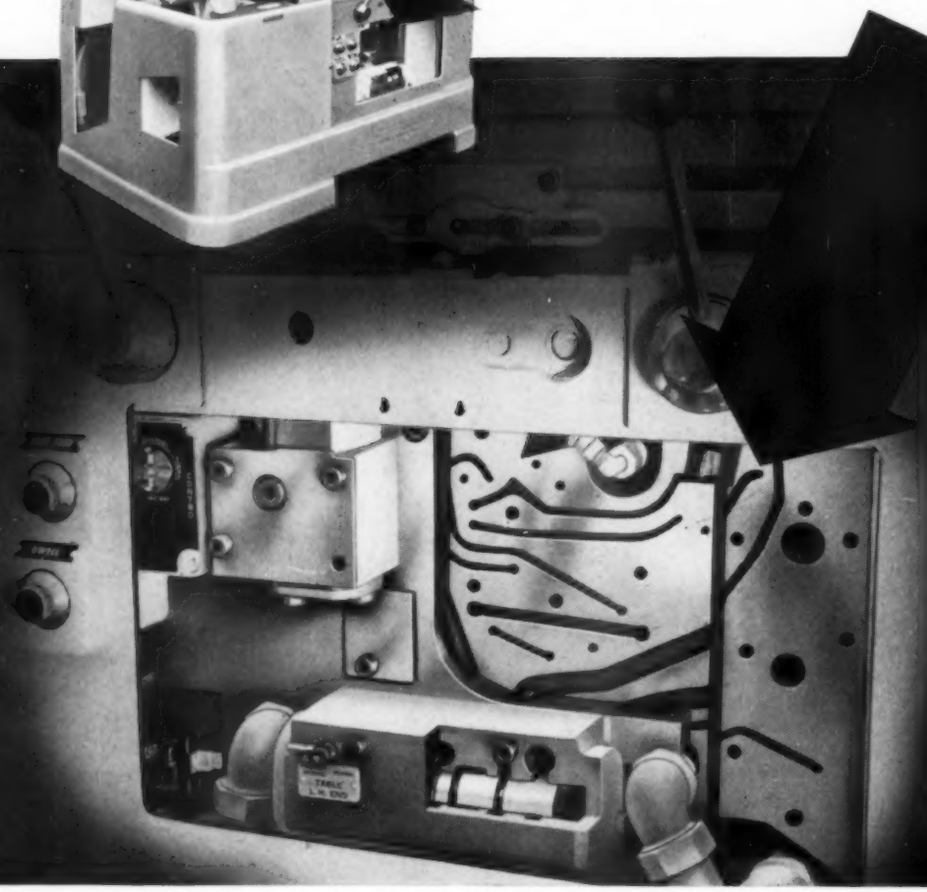
•
An Unusual Management Philosophy

NEW, IMPROVED HYDRAULICS

mean *LOWER COSTS* with the New Heald Bore-Matics





. . .and that's only *part* of the story!

In every model of Heald's complete line of new Bore-Matics, you'll find *many* advanced design features that mean faster production, greater precision, and better finish—with easier operation, quicker setups, and less maintenance. In addition to the latest advances in *hydraulics,* Heald offers you such outstanding features as: rigid box-type bases—ventilated bridges — permanently lubricated boringheads — roll out power units — and many more. *All,* features that make the new Heald Bore-Matics today's best buy in precision finishing.

THE hydraulic system in Heald Bore-Matics is *completely new* — with features designed to help lower your production costs and improve the quality of your precision finishing operations. The universal core plate and unit valve constructon, pointed out in cutaways above, are just two of the *six* "hydraulic reasons" for specifying Bore-Matics on your production line. Here they are — each, a contribution to higher-than-ever machine efficiency.

1. Universal Type Core Plate — eliminates pipes and fittings, permits quick valve change-over for different machine cycles.

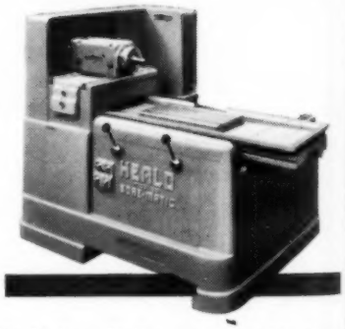
2. Unit Valve Construction — permits easier servicing. Interchangeable valves, accessible from front, can be quickly removed without disturbing piping.

3. Constant Feed Throttle — maintains constant, preset feeds, regardless of temperature changes. Assures continuous peak production with uniform accuracy and finish.

4. Isolated Reservoir and Pump — improves accuracy by minimizing heating and expansion of machine base. Low temperature hydraulic system circulates oil only as needed. New pump design permits faster cycles by speeding up table rapid traverse.

5. Improved Cylinder and Piston Design — give smoother table feed. Cast iron construction, with leak-proof piston rings. Special cylinder mounting minimizes table distortion.

6. Flared Steel Piping — provides tight, leak-proof joints, submerged in oil reservoir to prevent possibility of air bubbles.



Heald Bore-Matics are available in a complete range of sizes to meet all operating requirements — in single-end machines, like the Model 321 shown above, or in double-end models. Send for descriptive literature, or better still, let your nearest Heald representative show you how the new Bore-Matics can do a better job at less cost on your work.

HEALD

THE HEALD MACHINE COMPANY, Worcester 6, Mass.

Branch Offices in Chicago · Cleveland · Dayton · Detroit · Indianapolis · Lansing · New York

American Machinist

MAGAZINE OF METALWORKING PRODUCTION

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Chips and QUIPS

Our Cover . . . Eaton Screw Products Company operates these automatic screw machines in the little county-seat village of Eaton, Ohio, but ships its products as far away as New York, Texas, and Michigan. Perhaps this Kodachrome by Mayfield suggests a part of the reason (*A.M.*, page 94, Feb. 26).

Says Owner Justice: "The cleanliness of the shop is the desire and wish of each employee. The skilled work turned out by this shop is due to the interest of those employees. I have furnished a good, well-heated and ventilated substantial building; with an abundance of natural and artificial light; with machines direct from the manufacturer and all the necessary parts and tools, together with the secondary equipment to do skilled work. Each employee considers it his responsibility, and in his interest, to keep this equipment and shop in the very best condition at all times so we may turn out orders in exact accordance with the customer's drawing."

Management policy? Well, Mr. Justice is neither "boss" nor employer, but is considered by the employees as a member of the staff with "certain responsibilities consisting of business policy, financing, purchasing, and seeing to it that a sufficient backlog of work is maintained to furnish continued steady employment 5 days each week, 8 hr. per day for two shifts" (of 4 men).

Equipment includes five Acme-Gridley multiple-spindle screw machines, a W. & S. turret lathe, a Logan lathe with turret, a hand miller and several tool grinders.

There are no men in the picture because "any number less than all of them would create a feeling not desirable—and certainly all of them would in no way be helpful for the purpose for which the picture was taken." . . .

Travel Broadens—the Feet . . . The late James H. McGraw believed that real technical editing is done from the field. . . . This issue is living testimony to that belief. Its content results from trips to Eaton, Ohio; Worcester, Mass.; Pittsburgh, Pa. (2); Old Greenwich, Conn.; Buffalo, N. Y.; Indianapolis, Ind. (2); Richmond, Ind.; Elyria, Ohio; Rockford, Ill.; Jersey City, N. J.; and Washington, D. C.; as well as several excursions about our "home bases" of New York, Chicago, and Detroit. Paradoxically, the Buffalo, Old Greenwich and one Pittsburgh trips were made from Chicago, the Rockford one from New York—because our editors specialize for greater thoroughness.

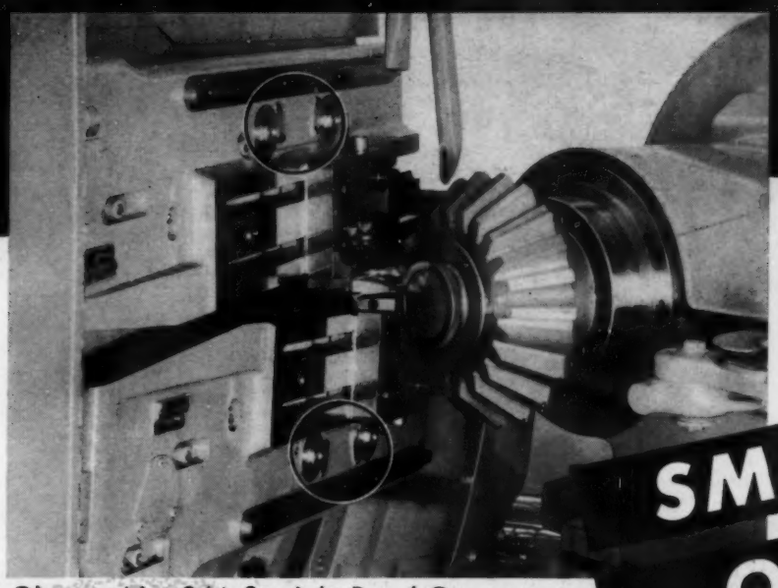
Tooling . . . Our lead article, the result of an eye-opening visit, shows a couple of specialty shop trucks—A. B. McCrea, factory manager at NATCO, describes and pictures about five more. . . . Then there're a half dozen assembly and diamond-turning ideas from Electrolux, details on tooling for lignum-vitae (the wood that outwears steel on some jobs), how a rail fixture is used in drilling bearing housings by Link Belt (by Leonard C. Heinlein, asst. supt. of the Dodge Plant) . . . Chester Ricker draws and describes a typical few of Bendix-Westinghouse's 500 applications of its own "pneumatic muscle" to tough clamping and assembly jobs, and A. L. Pranses, metallurgical engineer for Westinghouse, describes how carbide inserts can rejuvenate plastic transfer molds . . . To round out this gem-studded collection (including as always, the "Practical Ideas"), L. J. Mastache presents a new contender for the title of most valuable tools—your men's eyes.

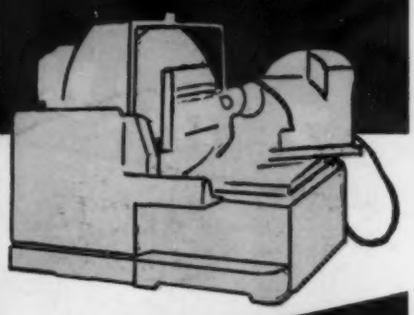
Others . . . C. Dixon, welding section of Alcoa, helps you understand—and make—spot welds in aluminum. One Reference Book Sheet diagnoses faults in torch cutting, another shows where colloidal graphite can help lubricate, the third how to anodize aluminum.

Coming . . . July 1 *A.M.* will bring several brand-new ideas, including a cover showing how Warner & Swasey induction-hardens machine ways and a lead article describing Ford's revolutionary radiator-production methods . . . There's an up-to-the-moment report on how to work aluminum and its alloys, articles on welding fixtures at Odin Stove, brush anodizing, manual hidden-arc welding, and a group of shop shots.

GOVERNOR MAKER. . . Irl Carlton Martin, born in Broken Bow, Neb., Dec. 12, 1895, reversed Horace Greeley's classic instructions to young men. He left his father's chain of implement stores, electric and ice plant and farms to come to Armour Institute for technical training, then had two years in the Army during World War I, emerging with the rank of second lieutenant. He joined Woodward Governor Company, Rockford, Ill., in 1921 as an errand boy, then became successively apprentice machinist, machinist, assembly man, draftsman, service and sales, general manager, treasurer and general manager, and finally president and board chairman in 1941.

Mr. Martin has carried on the traditions of the Woodwards in the operation of this business, developing modification in their unusual management philosophy as conditions required. His description of this philosophy appears in this issue.





SMOOTHER QUIETER

CONIFLEX* GEARS CUT ON THE No. 24A STRAIGHT BEVEL GENERATOR

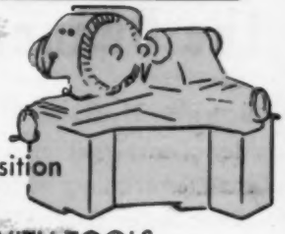
The new Gleason No. 24A Straight Bevel Generator produces Coniflex* gears for large applications such as power shovels and cranes, road machinery, steel mill table drives and many other applications . . . also of close and fast roughing of heavy pitch gears using Tanruf and Tan-Acruf tools . . . equipped with easy-to-operate hydraulic features and centralized controls.

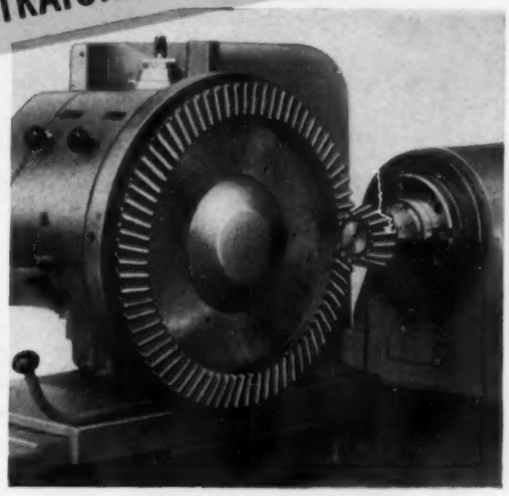
*Coniflex gears —— straight bevels with localization of tooth bearing . . . obtained by simple dial adjustments on the gear generator,

TESTED

on the Gleason No. 27 Hypoid Tester . . .

- to establish correct machine setup
- to check consistency of production
- to determine correct final mounting position





WITH TOOLS . . .

SHARPENED on the Gleason No. 12 Generator Tool Sharpener . . . a wet-type grinder providing an excellent finish on the cutting tools, assuring fine surface finish of the cut gears.

* Coniflex—Straight bevels with localized tooth bearing Reg. U. S. Pat. Off.

GLEASON *Works*
1000 University Avenue
Rochester 3, N. Y., U. S. A.

Builders of Bevel Gear Machinery for Over Eighty Years

Milling the channels in journal boxes on a CINCINNATI No. 56-90 Duplex Hydromatic with extra features for railroad shops.

. . . Duplex Milling the Channels in Journal Boxes

CINCINNATI No. 4-48 Duplex Hydromatic Milling Machine. Also built in plain style; 12 sizes of each from 24" to 90" table travel.

The CINCINNATI Hydromatic illustrated here mills the channels in both sides of cast steel journal boxes, taking a cut about 9" wide by 12½" long, averaging ⅜" deep. Two-way feed cycle and 90" table travel permits the use of two sets of fixtures. While two parts are being milled, the operator has plenty of time to reload the other two fixtures. The face mills are 9" diameter, and take the entire width of cut in one pass. ¶ CINCINNATI Hydromatics have ample power for work of this type; up to 50 hp in the larger sizes, if desired. And to keep down the cost of milling small quantities, Hydromatics may be equipped with quick setup features, like the one in the illustration. It has verniers and scales for the spindle carriers and quills; quick-clamping device for quills; counterweights for spindle carriers. ¶ Other features of CINCINNATI Hydromatics are equally important. Would you like to know more about them? Write for catalog M-1372-1 which contains complete specifications.

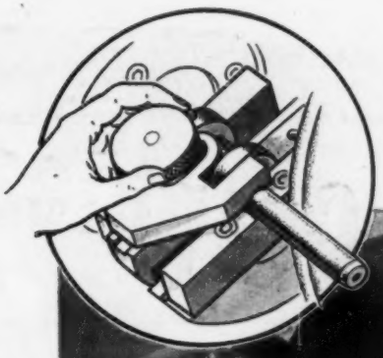
CINCINNATI

THE CINCINNATI MILLING MACHINE CO.

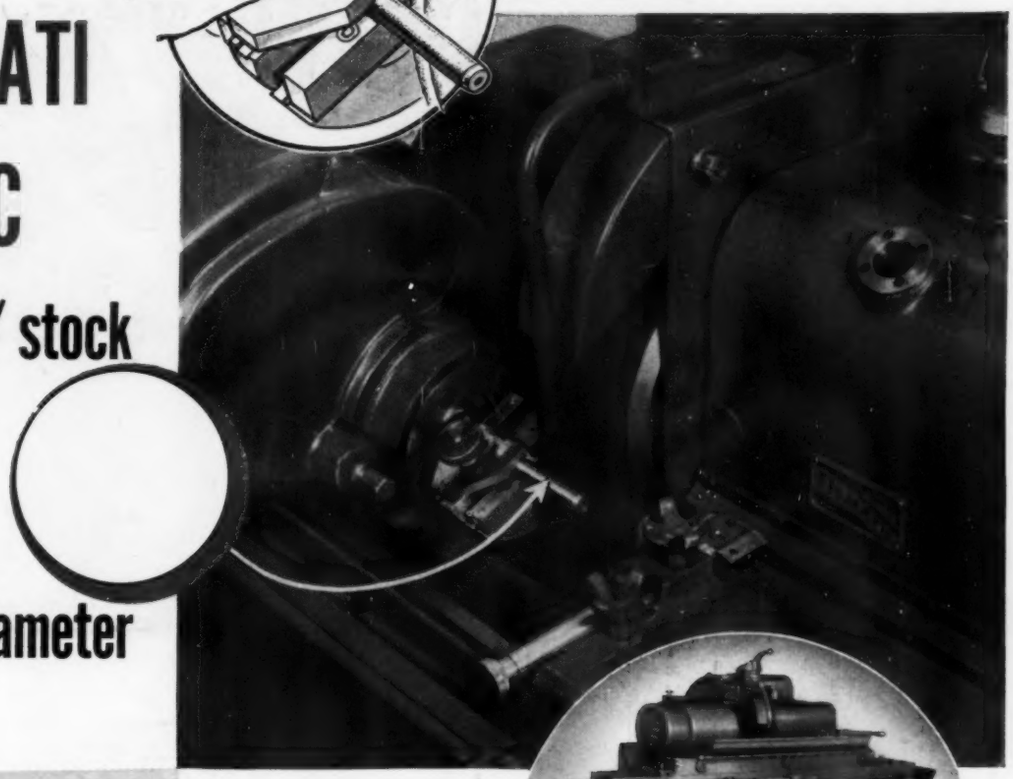
CINCINNATI 9, OHIO, U. S. A.

Milling Machines • Broaching Machines • Cutter Sharpening Machines
Flame Hardening Machines • Optical Projection Profile Grinders • Cutting Fluid

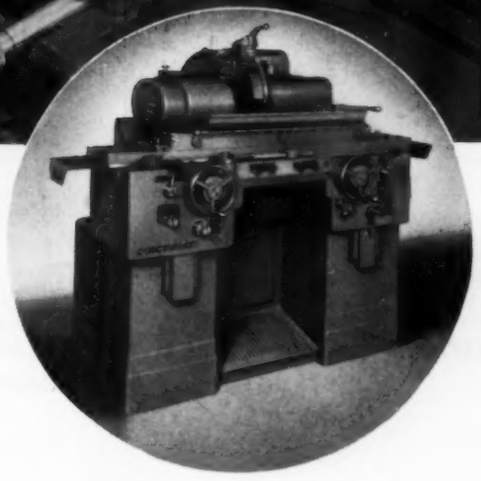
4" CINCINNATI FILMATIC grinds .050" stock off one side of eccentric diameter



Left: This drawing illustrates the convenience of loading and unloading the fixture. The operator's hand is always on top.



Close-up of CINCINNATI FILMATIC 4" Plain Hydraulic Grinding Machine, showing fixture developed by Cincinnati Application Engineers to grind an eccentric diameter on a small crankshaft.



Right: CINCINNATI FILMATIC 4" Plain Hydraulic Grinder. Complete specifications may be obtained by writing for catalog G-551.

Intermittent loads — like grinding off-center parts — are usually avoided by most grinding men. But sometimes it really pays off because it eliminates some other operation. The illustration above is a good example. Here it was necessary to grind a short section .050" eccentric in small crankshafts produced by an electrical manufacturer. Cincinnati Application Engineers assigned the job to a CINCINNATI FILMATIC 4" Plain Hydraulic Grinder with live spindle headstock, and equipped the machine with a special work holding fixture. The headstock electrical controls are arranged to consistently stop the headstock spindle at the same spot within a few degrees, for quick and safe loading and unloading. Almost .050" stock is removed, practically all of it from one side of the ground diameter. The machine handles this heavy stock removal without a whimper, thanks to FILMATIC spindle bearings and other Cincinnati features. Automatic infeed is built into the machine to further aid production and eliminate operator fatigue. ¶This is one of the many ways in which our engineers have been helping all types of industry to increase production of their precision ground parts. They have the know-how to help you, too. Why not submit your grinding problems to them?

CINCINNATI

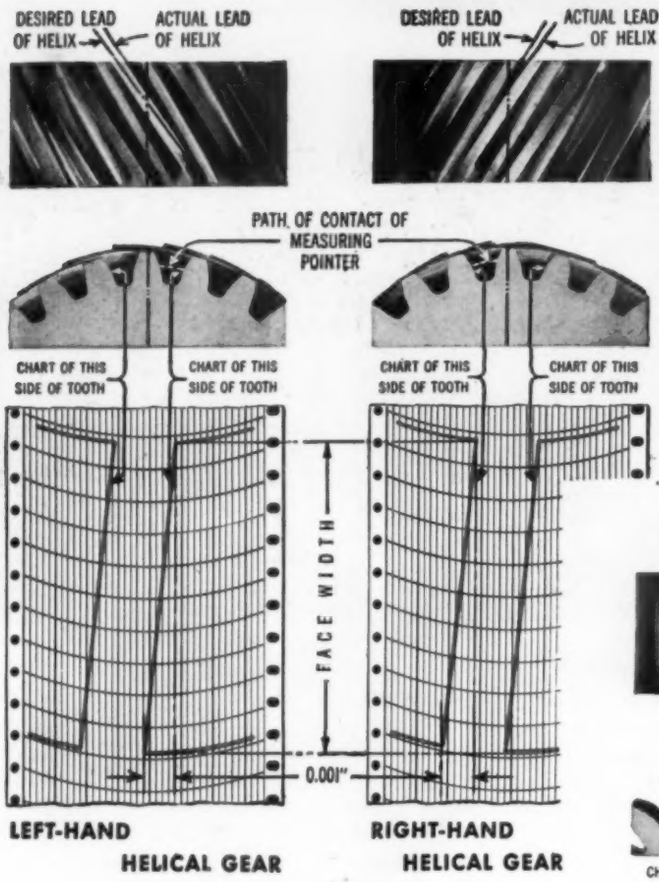
CINCINNATI GRINDERS INCORPORATED

CINCINNATI 9, OHIO, U. S. A.

CENTER TYPE GRINDING MACHINES • CENTERLESS LAPPING MACHINES • CENTERLESS GRINDING MACHINES

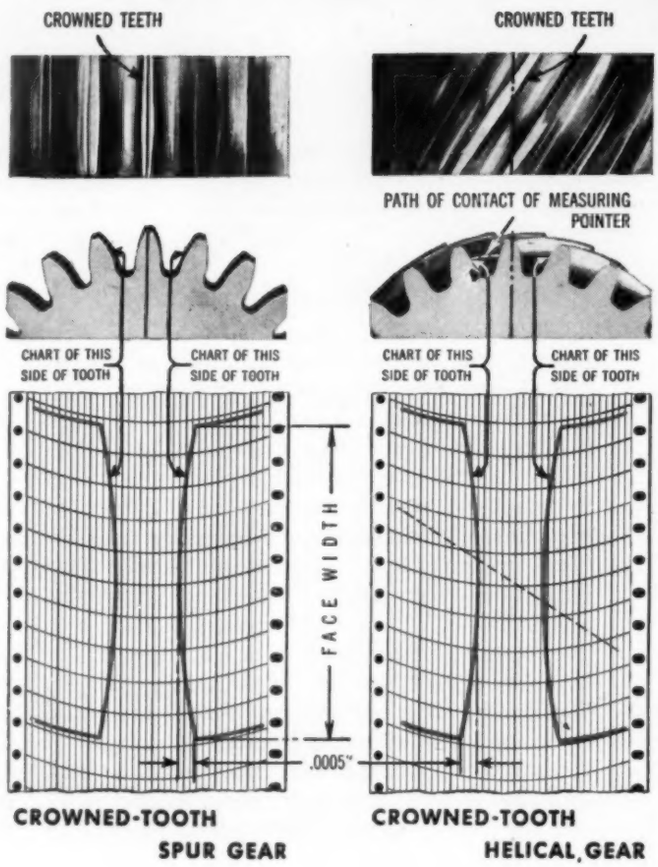
Graphically Charted OF LEAD, CROWN

...with the Newest


DESIRED LEAD OF HELIX
ACTUAL LEAD OF HELIX
DESIRED LEAD OF HELIX
ACTUAL LEAD OF HELIX
PATH OF CONTACT OF MEASURING POINTER
CHART OF THIS SIDE OF TOOTH
CHART OF THIS SIDE OF TOOTH
CHART OF THIS SIDE OF TOOTH
CHART OF THIS SIDE OF TOOTH
FACE WIDTH
0.001"

LEFT-HAND HELICAL GEAR

RIGHT-HAND HELICAL GEAR


CROWNED TEETH
CROWNED TEETH
PATH OF CONTACT OF MEASURING POINTER
CHART OF THIS SIDE OF TOOTH
CHART OF THIS SIDE OF TOOTH
CHART OF THIS SIDE OF TOOTH
CHART OF THIS SIDE OF TOOTH
FACE WIDTH
.0005"

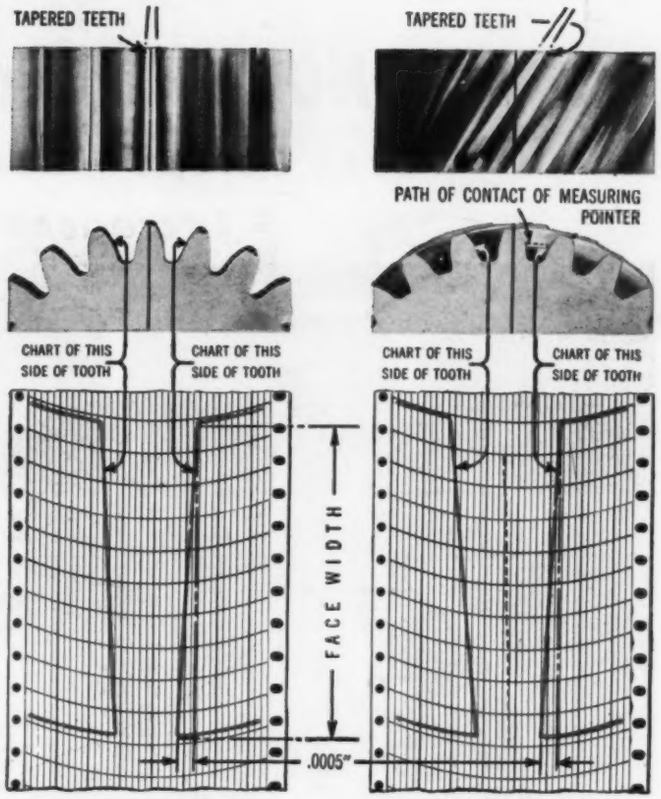
CROWNED-TOOTH SPUR GEAR

CROWNED-TOOTH HELICAL GEAR

THE FELLOWS METHOD...MACHINES AND TOOLS FOR

Inspection AND TAPER

Fellows Inspection Instrument



The No. 12H Fellows Lead Measuring Instrument presents an outstanding development in the art of checking gears. For simplicity of set-up and operation it cannot be equalled . . . a complete change in set-up, for the average gear, in less than 5 minutes!

In addition to checking by means of a one-ten thousandth dial indicator, a recorded chart graphically enlarges departures from theoretical perfection 500 times. Like all Fellows Recording Inspection Instruments, its functioning can be easily and definitely checked. The instrument by means of a master verifies its own accuracy!

This new basic Inspection Instrument is fully explained and illustrated in a circular awaiting your request. The Fellows Gear Shaper Company. Head Office and Export Dept., Springfield, Vermont, U.S.A. Branch Offices: 616 Fisher Bldg., Detroit 2, or 640 West Town Office Bldg., Chicago 12, 7706 Empire State Bldg., New York 1.

Fellows

ALL OPERATIONS FROM BLANK TO FINISHED GEAR

For WORKABILITY

It's VAN NORMAN No. 36 Ram Type Miller

• Saves Setups • Cuts Idle Machine Time

• Increases Production

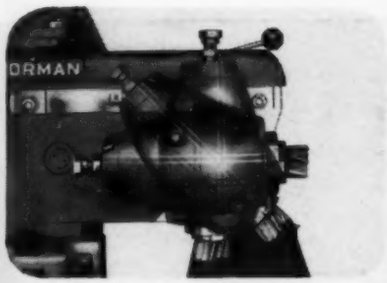
"It pays to Van Norman it"

The versatility of the Van Norman ram-type milling machine provides a greater work range than available on single purpose machines.

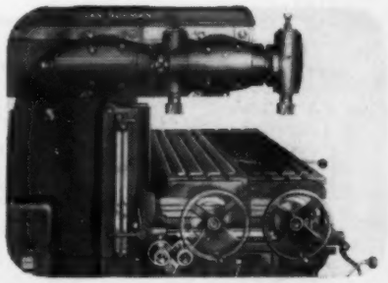
The adjustable cutterhead in combination with the movable ram enables you to perform conventional horizontal and vertical as well as angular milling. This feature cuts setup time by as much as 50% . . . increases productivity proportionately. In addition, front and rear directional controls of power feeds simplify operations . . . cut operator fatigue.

The Van Norman No. 36 Miller is ideal for use in the tool room, job shop, pattern shop, experimental laboratory, die and mold shop and for production work.

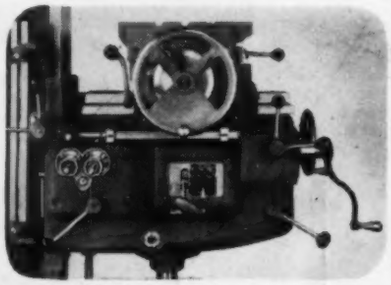
Write for illustrated bulletin, today.



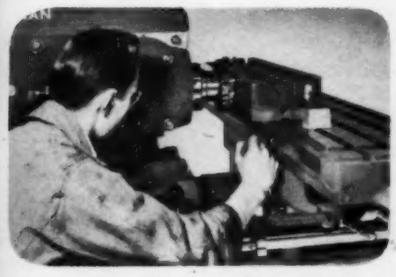
Adjustable cutterhead permits vertical, horizontal or angular milling on one miller. Its versatility is equal to three single-purpose machines.



Adjustable cutterhead and movable ram in combination with the saddle crossfeed provide maximum milling capacity and versatility.

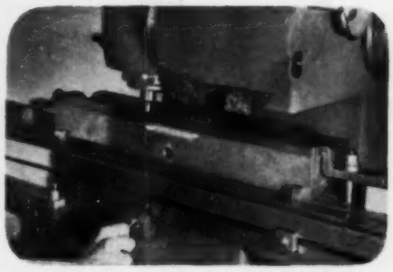


Front and rear directional control of hand and power feeds give complete visibility and control of operations from either location. Reduces worker fatigue . . . improves work accuracy.

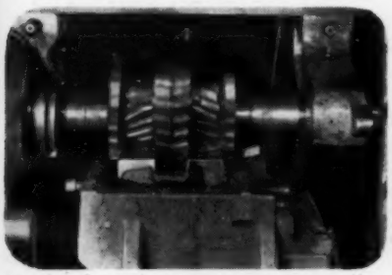


Horizontal milling—with cutterhead locked in horizontal position, operator uses rear directional controls and starts with a face milling operation.

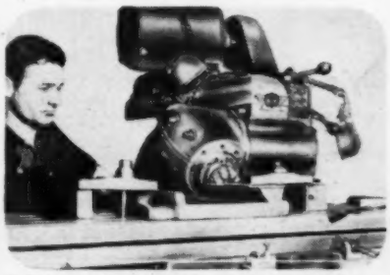
Angular milling—Here a V is being milled. Note that only the position of the cutterhead has been changed; workpiece is still in original position.



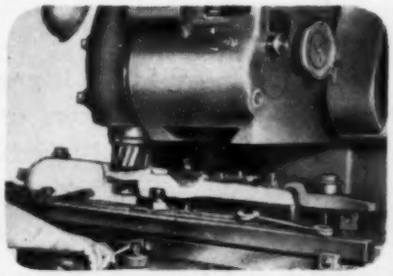
Vertical milling—Operator completes job with recess milling operation, using front directional controls. One work setup with simple cutterhead position changes completes most jobs.



Horizontal setup for boring and facing operation. The ram-type overarm with dovetail ways and outer support assures rigidity and accuracy.



With head locked in angular position the operator is taking an angular cut and operates the miller with the rear directional controls.



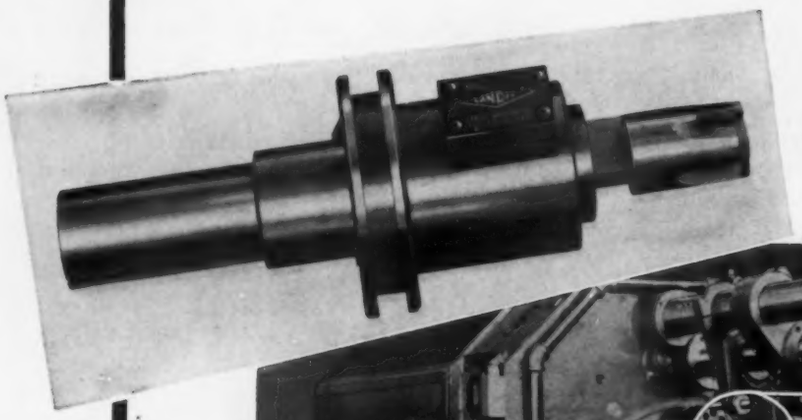
The ram-type miller used with adjustable cutterhead in the vertical milling position . . . operator using front directional controls.

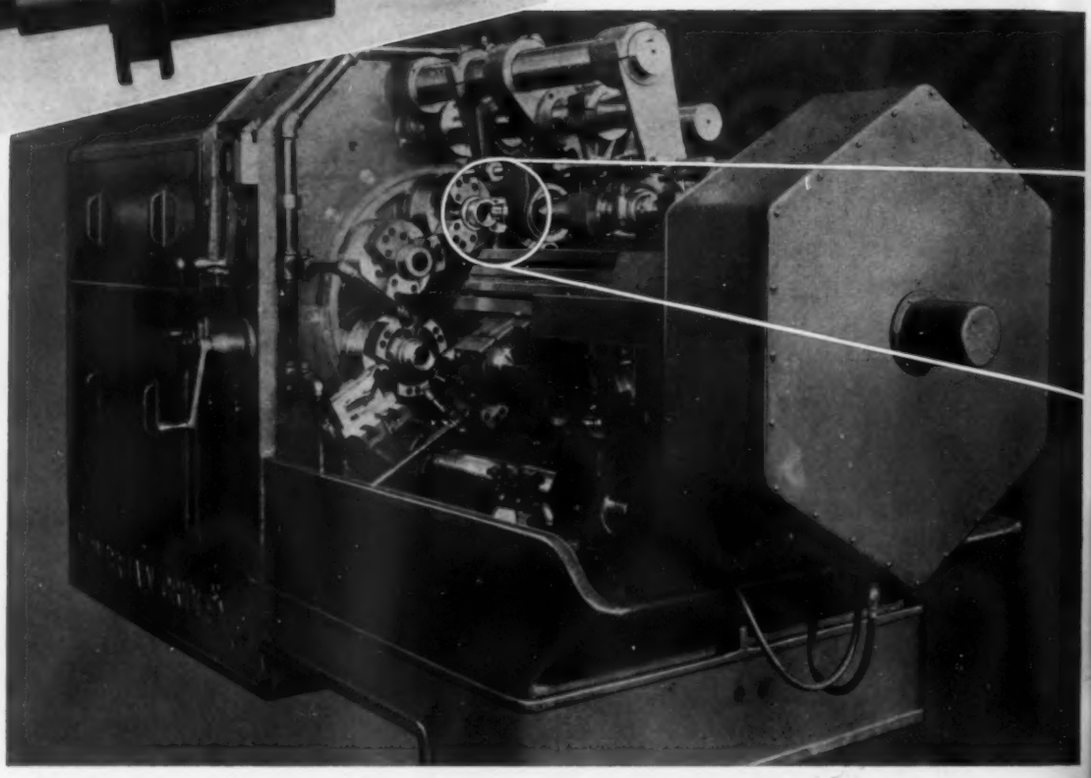
VAN NORMAN COMPANY

Springfield 7 *Massachusetts*

AN IMPROVED

Cuts Internal





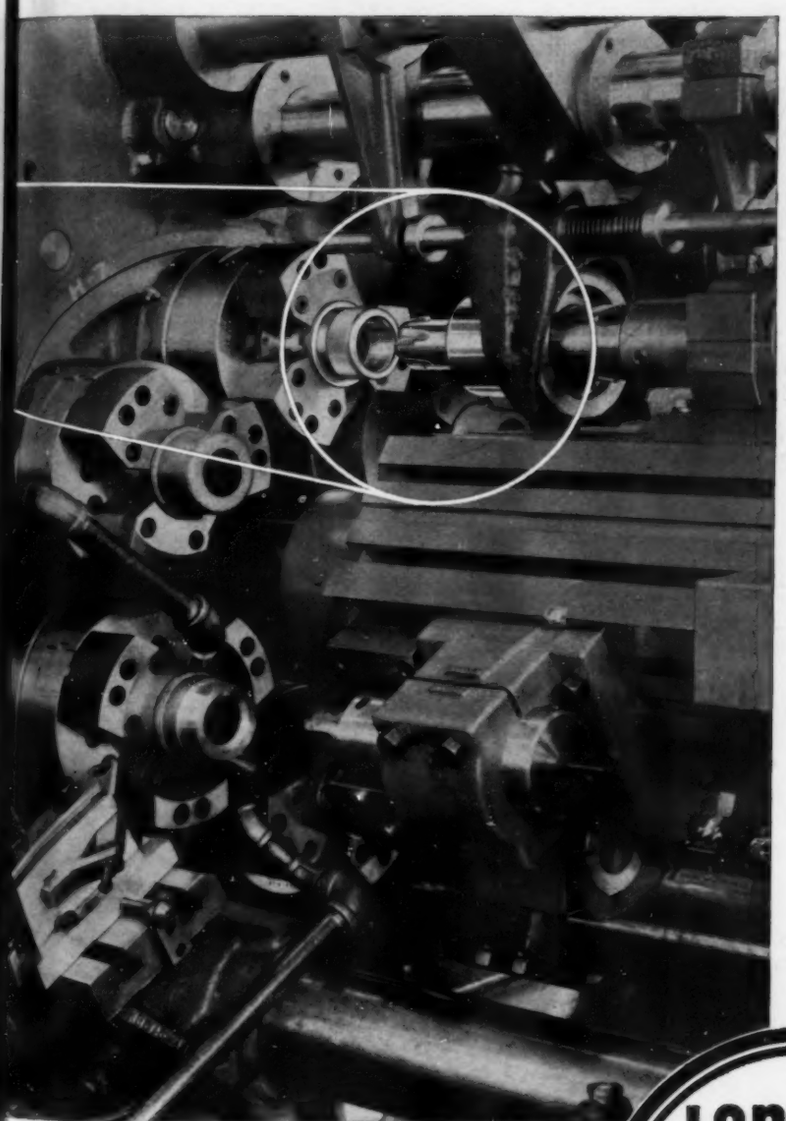
● The LL Taps are designed primarily for tapping tapered threads to A. P. I. standards. An outstanding feature is the detachable tap head permitting the use of various size tap heads to cover a wide range of thread sizes with a minimum amount of equipment.

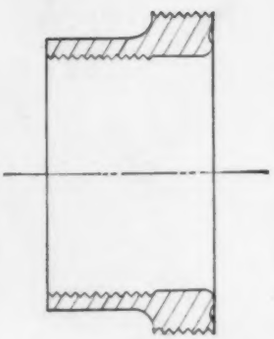
● In the improved Style ALM Heads, where an even number of chasers is used, no two chasers are directly opposite each other. This adds greater rigidity for the tap and permits the use of greater radial clearance, giving a freer cutting action with resulting increased chaser life. The Style LL Tap Body is made in four sizes to cover a range of nominal pipe sizes from 1" to 12", inclusive.

THE WORLD'S LARGEST MANUFACTURER OF

Landis TAP

Tapered Threads at 30 ft. per min.





● Using the new Landis Style LL Receding Chaser Collapsible Tap on an automatic screw machine, 11½ pitch tapered threads were tapped in quick change unions for oil field use to a length of 1-5/16" at the rate of 30 feet per minute. The pipe was cold worked forging 2⅜" in diameter of 185-220 Brinell hardness. The same piece is also made of malleable iron, and tapered threads are tapped at the rate of 120 feet per minute.

Write for Bulletin G-95

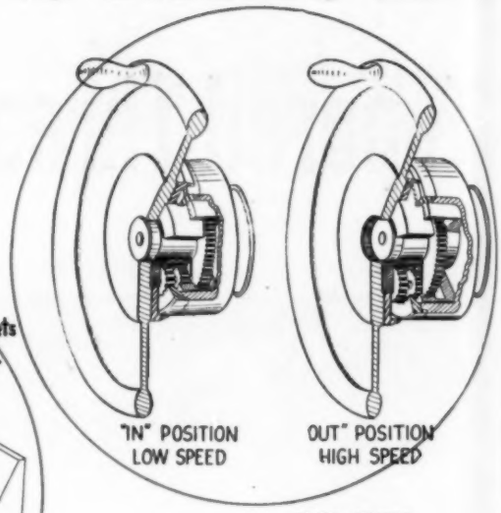
THREADING EQUIPMENT

LANDIS Machine COMPANY
WAYNESBORO
PA., U.S.A.

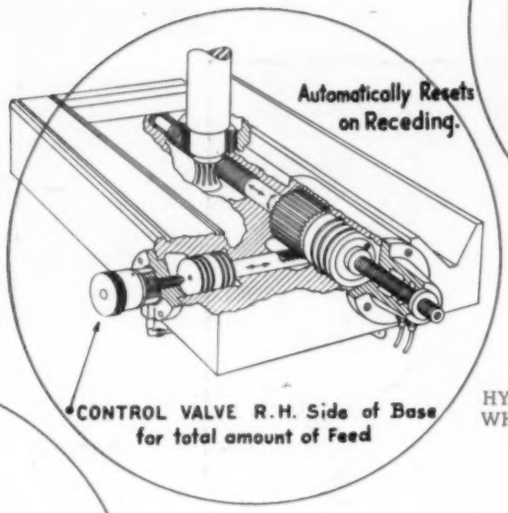
for Precision Grinding Results

straight cylindrical / taper / shoulder / profile

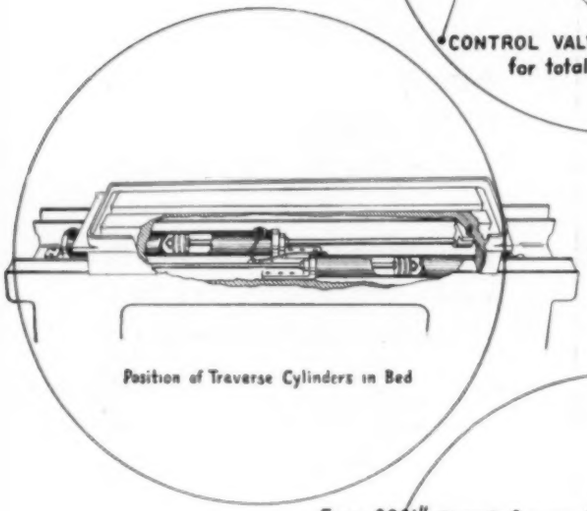
these outstanding design features



TWO SPEED
HAND TRAVERSE

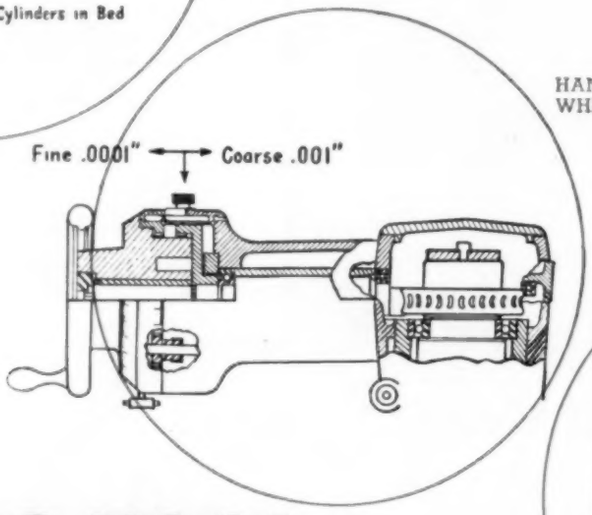


HYDRAULIC
WHEEL FEED

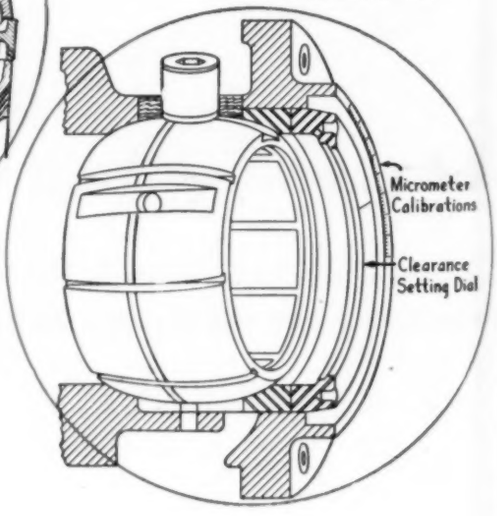


HYDRAULIC TABLE
TRAVERSE

HAND AND AUTOMATIC
WHEEL FEED



MICROSPHERE WHEEL
SPINDLE BEARINGS



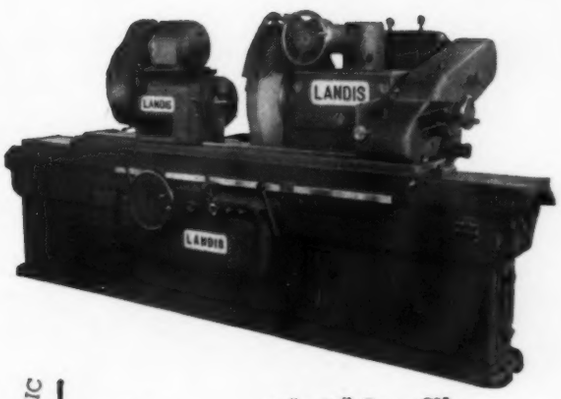
LANDIS TOOL
Precision Grinders

in Job Shop - Tool Room - Volume Production

low unit cost / fine finishes / close tolerances

4" Type H

LANDIS TOOL plain hydraulic grinders



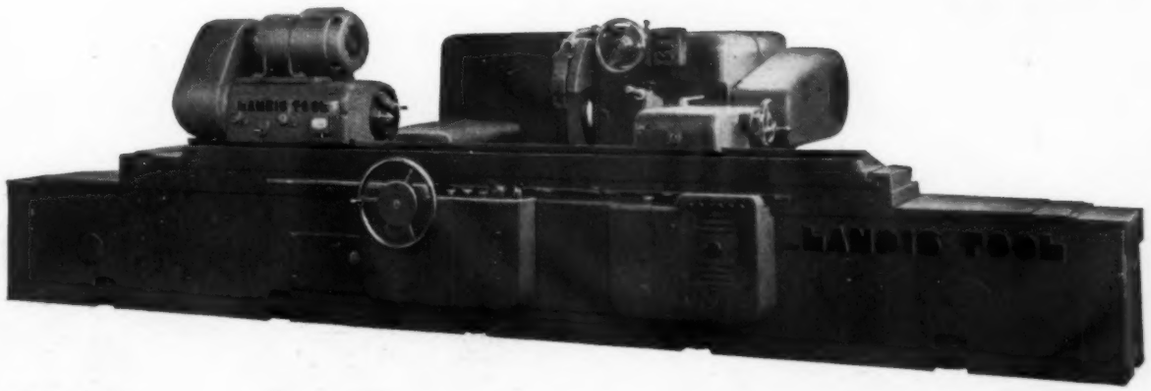
10"—14" Type CH

check the features

	TWO SPEED HAND TRAVERSE	*HYDRAULIC WHEEL FEED	HYDRAULIC TABLE TRAVERSE	HAND AND AUTOMATIC WHEEL FEED	MICROSPHERE WHEEL SPINDLE BEARINGS
4" Type H	✓	✓*	✓	✓	✓
6" Type CH 10" Type LCH	✓	✓*	✓	✓	✓
10"—14" Type CH	✓	✓*	✓	✓	✓
14"—16" Type F	✓	✓*	✓	✓	✓

* Hydraulic straight infeed available as optional equipment.

6" Type CH



14"—16" Type F

LANDIS TOOL COMPANY / WAYNESBORO, PENNA.

NO FINER STEEL BARS HAVE EVER BEEN MADE

than Union

Ground Rounds...

...Use them where Split-Hair Accuracy, Arrow-Like Straightness, Roundness and a Mirror Surface are Needed

Here are the finest commercial steel bars that money can buy—in sizes from ⅛" to 8", inclusive—just the bars you may need to improve product quality or to cut costs.

Union Ground Rounds are extremely accurate. The standard tolerance of Cold Drawn and Ground Rounds (Union Special Finish) in sizes ⅛" to 1⅞", inclusive, is plus .000", minus .002". That of Turned and Ground Rounds (Union Precision Shafting) is plus .000", minus .002" in sizes 1⅛" to 2 7/16", inclusive, and plus .000", minus .003" in sizes 2½" to 8", inclusive.

Since these tolerances always are *undersize*, Union Ground Rounds assemble readily—never require costly dressing down to fit.

Union Ground Rounds are uniformly straight and round, *too*—with a lustrous, smooth surface that minimizes friction and provides an attractive, bright finish.

With these fine steel bars you can assure:

1. **Perfect alignment of bearings, gears, cams, clutches and other moving parts;**
2. **Smooth, quiet, balanced operation in the most intricate mechanism;**
3. **Freedom from vibration at high speeds;**
4. **Reduced wear;**
5. **High Operating efficiency;**
6. **Longer service life;**
7. **Lower assembly, maintenance and per-year-of-service costs;**
8. **Attractive appearance.**

Union Cold Drawn and Ground Rounds provide the improved machinability and physical properties developed in cold drawing—while Union Turned and Ground Rounds may be machined unsymmetrically or threaded without warpage or distortion.

Both types can be produced in all standard and special carbon, alloy and stainless steel analyses. They can be furnished annealed, normalized, spheroidized, heat treated or strain relieved as required. Let us show you where Union Ground Rounds can benefit your product —and your costs.

REPUBLIC STEEL CORPORATION
Union Drawn Steel Division • Massillon, Ohio
GENERAL OFFICES • • • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

Republic

REPUBLIC STEEL REG. U. S. PAT. OFF.

US

UNION COLD DRAWN STEELS

REG. U. S. PAT. OFF.

Free-Machining Bessemer, Alloy and Enduro Stainless Steels

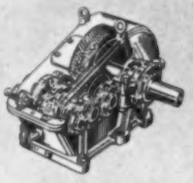
•

Union Cold Drawn Special Sections

•

Union Cold Drawn and Ground Rounds; Turned and Polished Rounds; and Turned, Ground and Polished Rounds (Union Precision Shafting.)

OTHER TYPES OF LINK-BELT POWER TRANSMISSION MACHINERY


HERRINGBONE GEAR SPEED REDUCERS

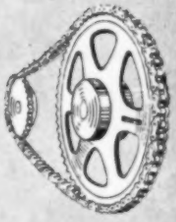
WORM GEAR SPEED REDUCERS

HELICAL GEAR SPEED REDUCERS

GEARMOTORS

ELECTROFLUID DRIVES

P.I.V. GEAR SPEED VARIATORS


SILVERLINK ROLLER CHAIN DRIVES

SILENT CHAIN DRIVES

STEEL AND MALLEABLE CHAIN DRIVES

V-BELT DRIVES

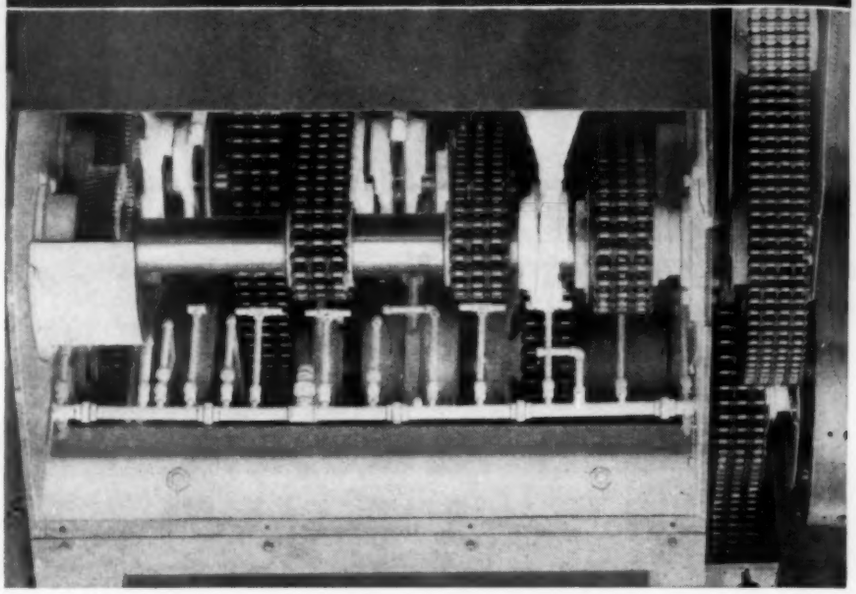
UNMOUNTED BALL AND ROLLER BEARING UNITS

ROLLER BEARING MOUNTED UNITS

BALL BEARING MOUNTED UNITS

BABBITTED BEARINGS

LINK-BELT *Silverlink* ROLLER CHAIN



MEETS THE TEST of SEVEREST SERVICE!

The 6-speed transmission shown above is a good example of the versatility of Link-Belt Silverlink precision-built roller chain and its ability to operate at high speeds under heavy loads.

Silverlink roller chains employed on this unit include 1-½" pitch quadruple chain drive from engine, and 2" pitch chains of double, triple and twin double width on the other drives.

To the inherent features of chain, including positive transmission, high efficiency and flexibility, Link-Belt standards of engineering and manufacturing excellence add unsurpassed precision, great strength, light weight, ability to withstand shock, and toughness that assures long life.

Let Link-Belt chain specialists aid you in applying Silverlink roller chain for power transmission or conveying purposes.

Silverlink is furnished in manufacturers' (A.S.A.) standard sizes in single and multiple width, to meet all requirements.

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8.
Offices, Factory Branch Stores and Distributors in Principal Cities.

11.109

LINK-BELT

Power Transmission Machinery

C-O Steals the Show!

21" BOX COLUMN SLIDING HEAD FLOOR DRILL

Designed to provide an accurate, fast, dependable drill for a moderate initial investment and low maintenance cost. Unit is equipped with anti-friction ball bearings; all castings are seasoned and sturdy; all gears of high alloy steel, accurately machined; all surfaces are hand scraped to a minimum tolerance. Available with V-belt drive — 16 spindle speeds. Power feed of positive, gear driven type. Four rates of speed are obtained through dial knob indicator. Automatic stop for predetermined depth drilling. 1-½" capacity.

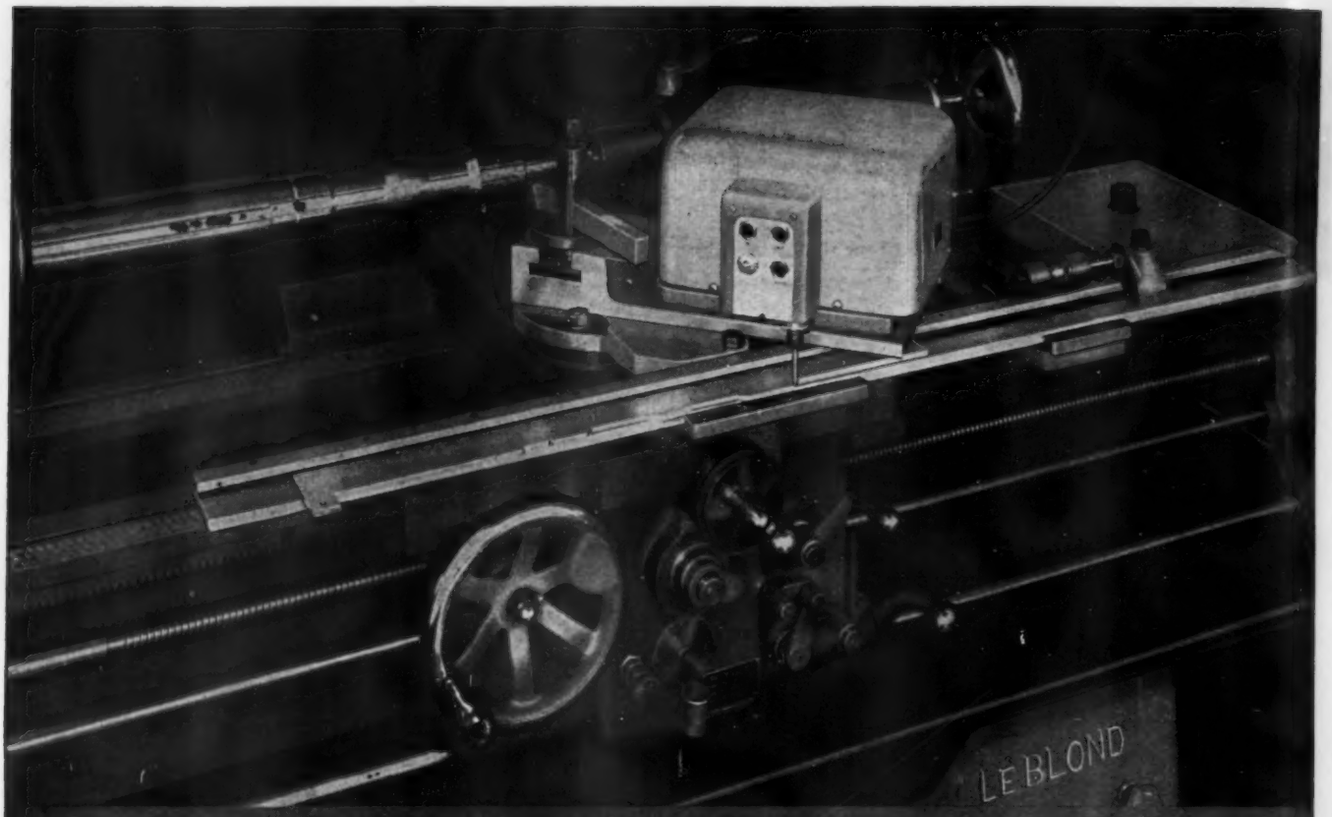
Since 1892, CANEDY-OTTO on a drill press has stood as a guarantee of advanced designing, quality construction, finer performance, long, trouble-free service. Write today for insert No. 90 illustrating the World's Most Complete Drill Press Line.

C THE WORLD OVER O

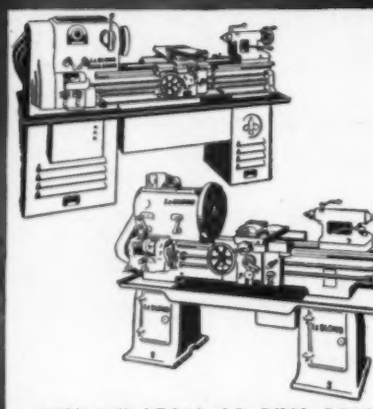
CANEDY-OTTO MFG. COMPANY

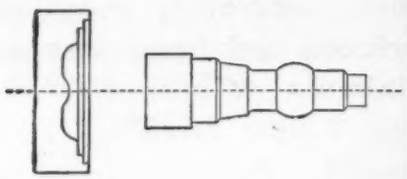
CHICAGO HEIGHTS, ILLINOIS

Builders of the World's Most Complete Drill Press Line — radial drills, sensitive drills, upright drills, hi-speed drills and special drilling machinery.



★NEW LeBLOND ELECTRIC DUPLICATING ATTACHMENT





FITS ANY REGAL OR DUAL DRIVE

You can install the new LeBlond Electric Duplicator in 10 minutes time without drilling or fitting. It's available for any Regal or Dual Drive, any size, anywhere. Operates on the template-tracer principle, and is controlled by electric push buttons for "in", "out", and "automatic". No special skill is required to operate or set it up.

PLUGS INTO LIGHT SOCKET

You can put your new duplicator right to work, because no complicated wiring is necessary. It comes equipped with regular plug which can be snapped quickly into the nearest light socket for 110/115 volt 50 or 60 cycle single phase service. The LeBlond electric duplicator is easy to install, easy to use, and just as easy to remove.

PERFORMS ALL OPERATIONS

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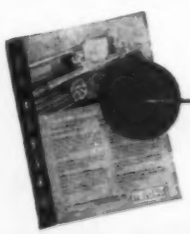
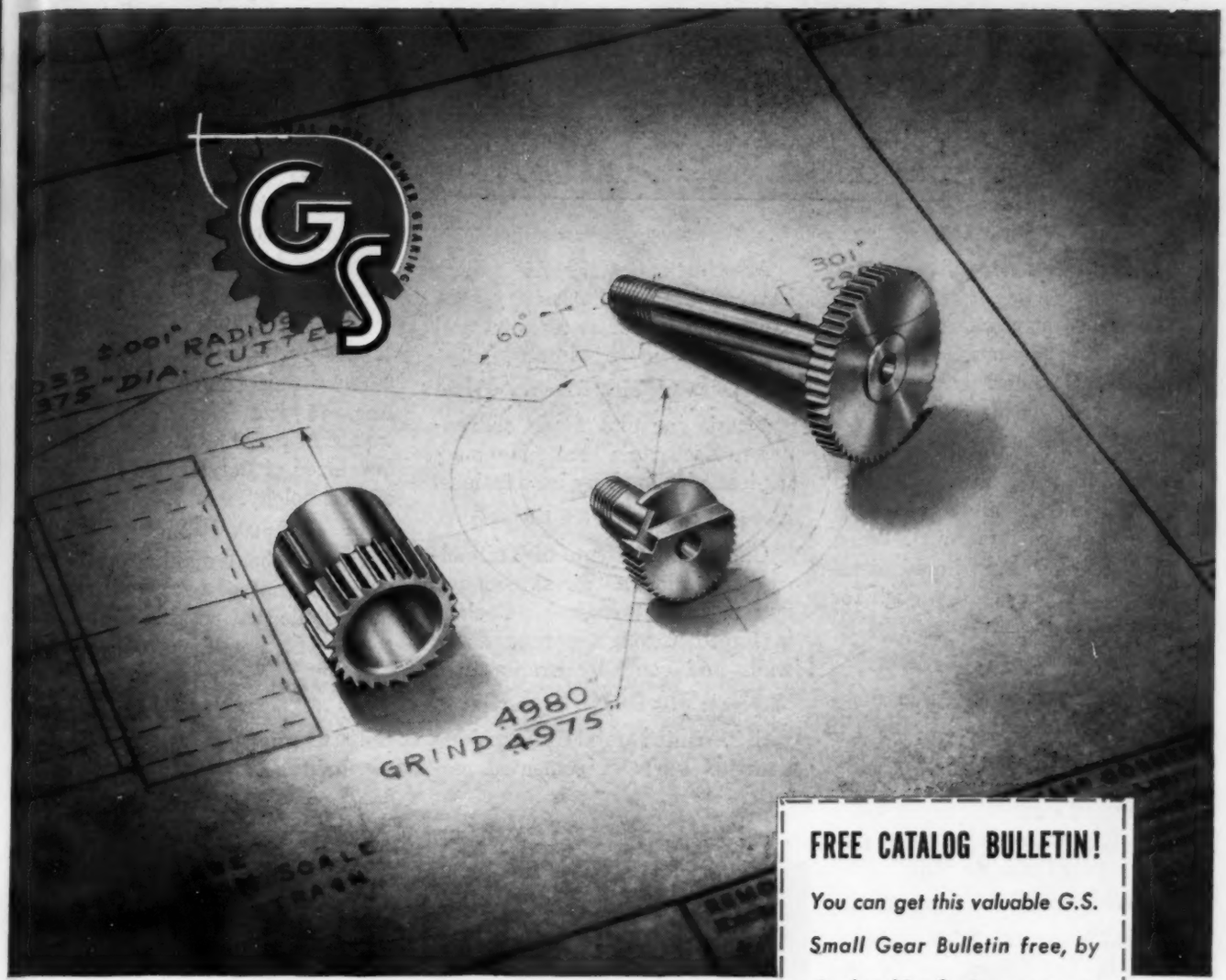


No other duplicator offers you so many advantages. For further information write for illustrated bulletin today. Write Dept. EC-1, The R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio.

LeBLOND



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MEMBER OF AGMA

WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF FRACTIONAL HORSEPOWER GEARS

The CONE AUTOMATIC MACHINE COMPANY sees many GOOD THINGS AHEAD

It is reported that . . . . . .

To prevent explosions caused by sparks, Emil Greiner Co., 161 6th Ave., N. Y., offers an industrial mixer driven by air pressure.

get ready with CONE for tomorrow

Ford Motor Co. makes dies of a bismuth-tin-lead alloy which is very soft and easily formed. When chilled to −320° F. in liquid nitrogen, the metal is hard enough for use in six to ten stampings.

be ready with CONE for today

A machine that records magnetically and automatically in code is made by Codit Co. of 3535 Dell Trail, Chattanooga. The record can be played back intelligibly only on another machine set for the same code.

get ready with CONE for tomorrow

Metal "super crystals" are being made in the laboratory of the University of Virginia. They are as large as an inch in diameter, but have the same characteristics as the usual microscopic crystals.

be ready with CONE for today

A new thermometer made by Leeds & Northrup of Philadelphia measures temperatures down to 10 K with an accuracy of one hundredth of a degree.

get ready with CONE for tomorrow

Hycar P. A. is a new synthetic rubber made by B. F. Goodrich which has been tested at temperatures up to 400° F. without apparent loss in properties.

be ready with CONE for today

Plastic clamps to support wires or tubes are made by Holub Industries, Inc. They guard against cutting insulation and are nonconducting.

Associated Battery Assemblers have an automobile battery that can be taken apart, repaired and reassembled in 15 minutes.

get ready with CONE for tomorrow

Plastic gas pipe made of Tennessee Eastman's Tenite is replacing iron pipe in many installations.

be ready with CONE for today

California Institute of Technology is testing a "sweat cooling" system for jet engines. Coolant is forced through porous metal walls and cools by evaporation.

get ready with CONE for tomorrow

S. S. White Dental Co. is making dentists' burrs of cemented carbide.

Stanolind Oil & Gas Co. will soon start production of motor fuel and other products from natural gas at Garden City, Kansas.

be ready with CONE for today

The purest helium ever distributed commercially (98.8% pure) will be made available by the U. S. Bureau of Mines. It will be known as "welding grade."

get ready with CONE for tomorrow

Paper pulp from southern New England and New York hardwoods is possible with a process developed at Polytechnic Institute of Technology.

be ready with CONE for today

U. S. Rubber is making an insulation material of foamed ureaformaldehyde that weighs only eight-tenths of a pound per cubic foot.

get ready with CONE for tomorrow

Magnesium alloys with twice the strength of those currently in use have been announced by the U. S. Army Corps of Engineers.

FOLLOW THESE PAGES FOR NEWS OF PROGRESSIVE PRODUCTION

A Precision Lathe: One of the many precision tools now serving the government at Arthur Tickle Engineering Works, Inc.

accurate machine operations

by super-skilled mechanics have played a vital role in our military efforts. In war as in peace, Arthur Tickle Engineering Works, Inc., has made painstaking perfectionism its goal. Through 41 years of service, our plant has earned a distinguished reputation based on fine machine equipment skillfully operated by able, ambitious workmen.

The Tickle Engineering Works offer the following services: Engineers—Boiler Makers—Builders of Special Machinery—Machine Work—Metal Spraying—Engine Repairs—Internal Grinding—Precision Cylindrical Grinding—Forging —Boiler Repairs—Welding.

ARTHUR TICKLE ENGINEERING WORKS, Inc.

21 DELEVAN STREET, BROOKLYN 31, N. Y.

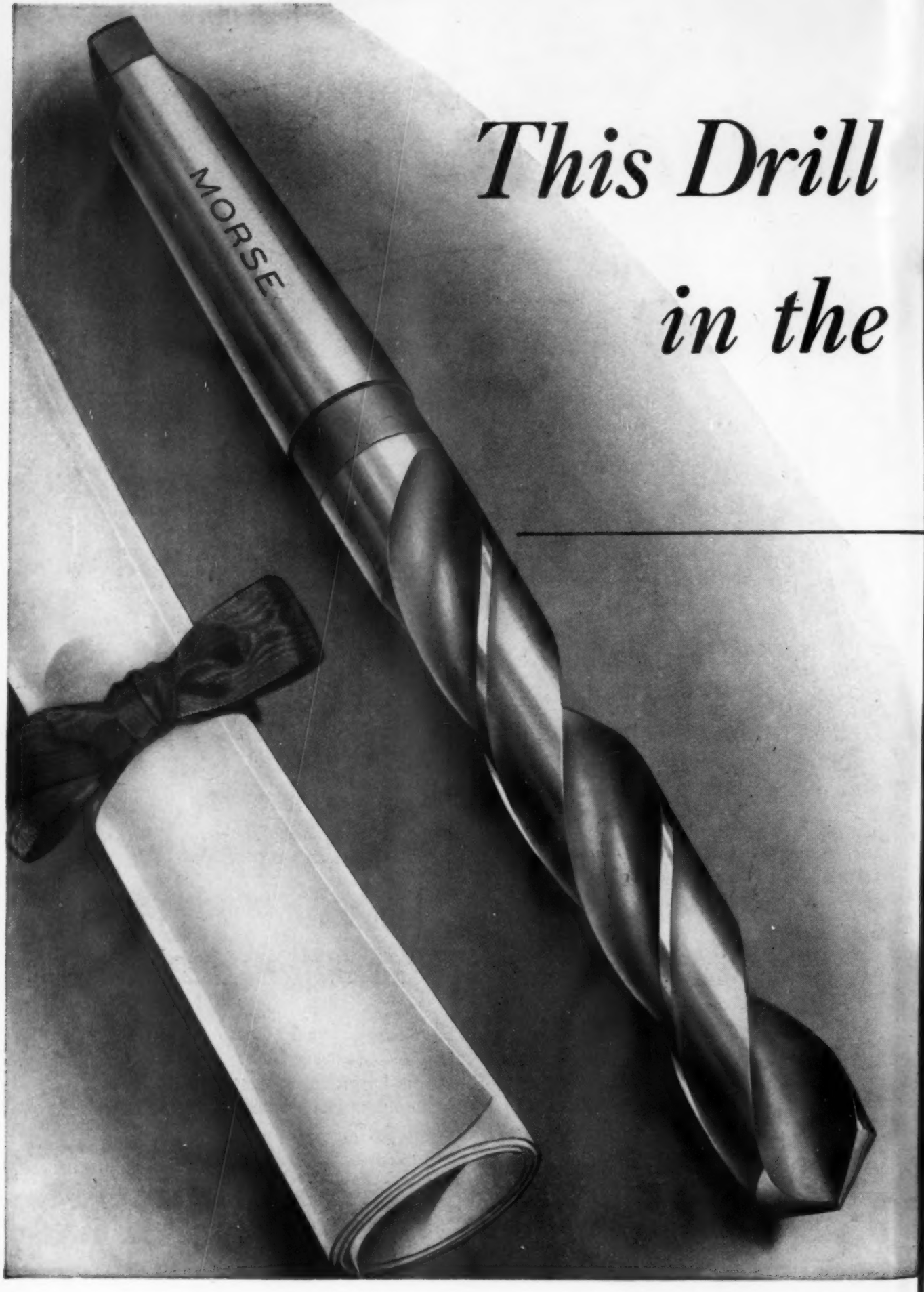
The Customer should know—

HE USES THEM . . . Here is a case where a customer features his "American" Pacemaker Lathe to symbolize the high quality of the work he produces. We salute the excellent judgment and perspicacity of Arthur Tickle Engineering Works, Inc. of Brooklyn, N. Y.

THE AMERICAN TOOL WORKS CO.

Cincinnati 12, Ohio, U. S. A.

LATHES AND RADIAL DRILLS



This Drill in the

Graduated with Honors "College of Hard Knocks"!

MORSE FORGED TAPER SHANK DRILL
Forged for Toughness — Milled and Ground to Morse Precision Standards

Here's a drill that offers a "liberal education" in serviceability and cutting efficiency. It's forged for strength and toughness, then milled and ground to the precision accuracy that's typical of all Morse tools. In addition, the *helix angle* selected for this drill is the result of long study to obtain greatest efficiency for cutting operations.

All these features *combined* provide you with an all-purpose drill that will earn its keep many times over — whether drilling gear forgings, connecting rods, crankshafts, cast iron, chrome nickel steels, etc. Buy this drill — it'll fill your bill! Your Industrial Supply Distributor can supply you.

Accuracy, Quality, Uniformity: the MORSE Code of Cutting-Tool Manufacture

MORSE TWIST DRILL & MACHINE COMPANY

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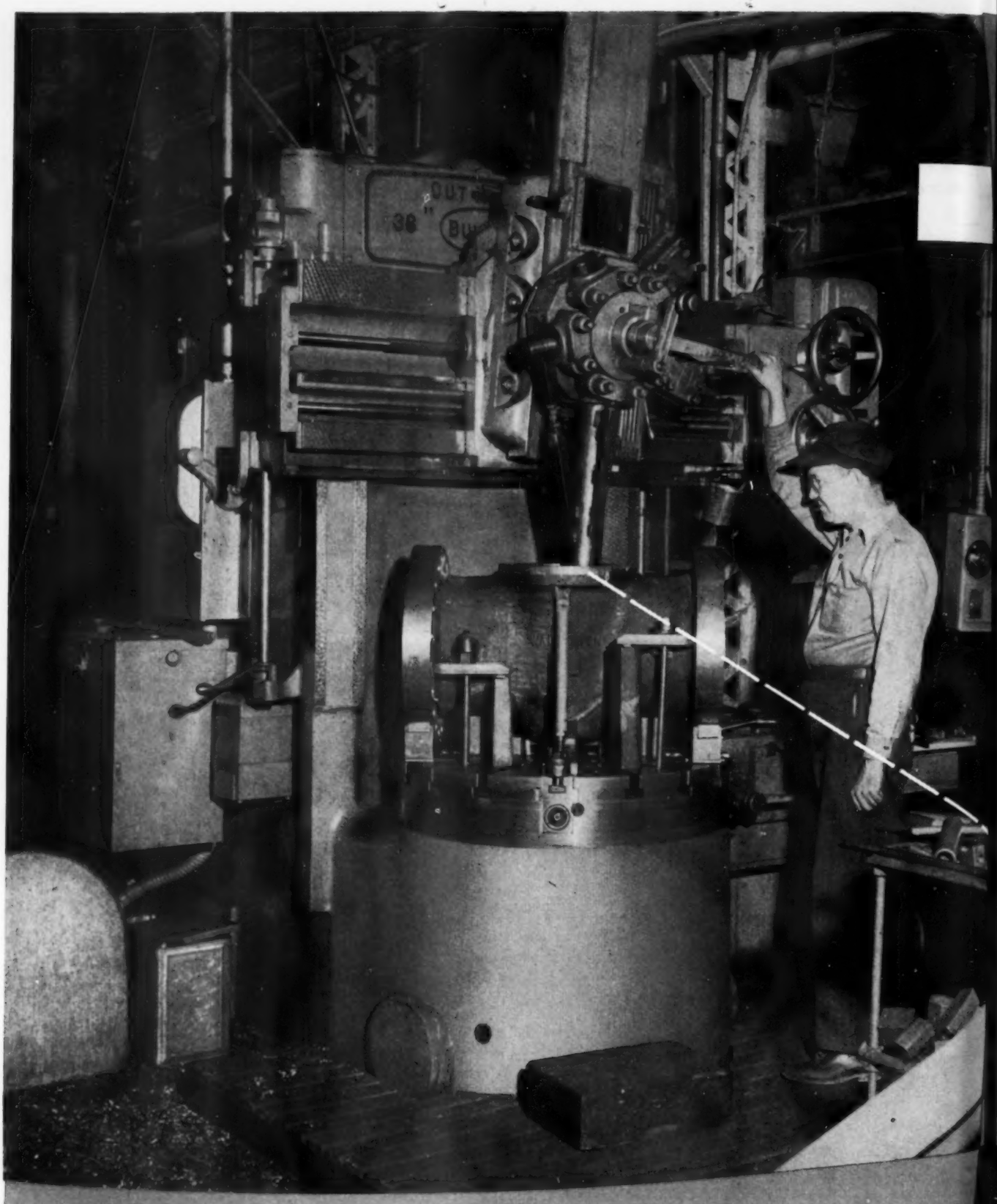
Store: 130 Lafayette St. • Detroit Store: 2952 East Grand Blvd. • Chicago Store: 570 West Randolph St. • San Francisco Store: 1180 Folsom St.



This BULLARD 36" Cut Master is **"really paying off"** at Newport News Shipbuilding & Drydock Company. Here you see it taper boring a large valve. On this job, it also faces the flange and counter bores, as shown on the cross-sectional drawing. The Cut Master **not only** saved 33⅓% on these three operations **but also** provided such a smooth finish that a grinding operation was eliminated.

BULLARD CREATES

PERFORMANCE REPORT FROM NEWPORT NEWS SHIPBUILDING & DRYDOCK COMPANY

CUTS COSTS 2 WAYS ON CAST STEEL VALVES with a 36" BULLARD Cut Master

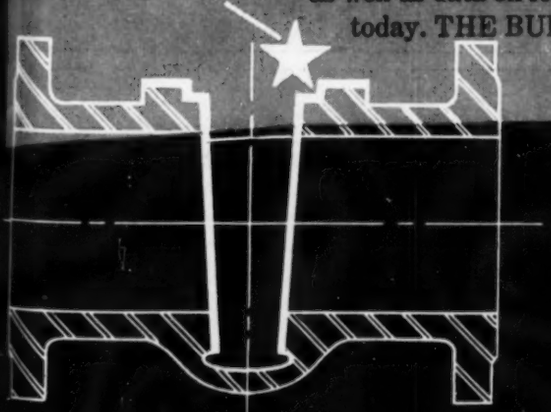
1. SAVED 33⅓% ON 3 OPERATIONS

2. ELIMINATED A GRINDING OPERATION

You, too, can expect savings on most of your jobs. Overall mass weight and rigidity combined with simultaneous cutting of two or three heads, rapid change of speeds and feeds, smooth delivery of power at the point of cutting permit Cut Master V. T. L.'s to take full advantage of the latest in cutting tools. It's easy to see why: The bed is cast in one heavy, rigid piece. Spindle is firmly supported top and bottom by large Timken roller bearings. Screw feeds provide and maintain a high degree of machining accuracy.

OTHER COST-CUTTING ADVANTAGES

Because the BULLARD Cut Master was designed specifically to save time on and between cuts, you find other unique features. The rapid and positive speed selection with the BULLARD pendant type control, limit-stops for simplified dimensional duplication, and centralized operating controls speed up operations and conserve costs. For complete description of these and other distinctive features, as well as data on feeds, speeds and sizes, write for Bulletin CVTL-4-1 today. THE BULLARD COMPANY, Bridgeport 2, Connecticut.



BULLARD

NEW METHODS TO MAKE MACHINES DO MORE

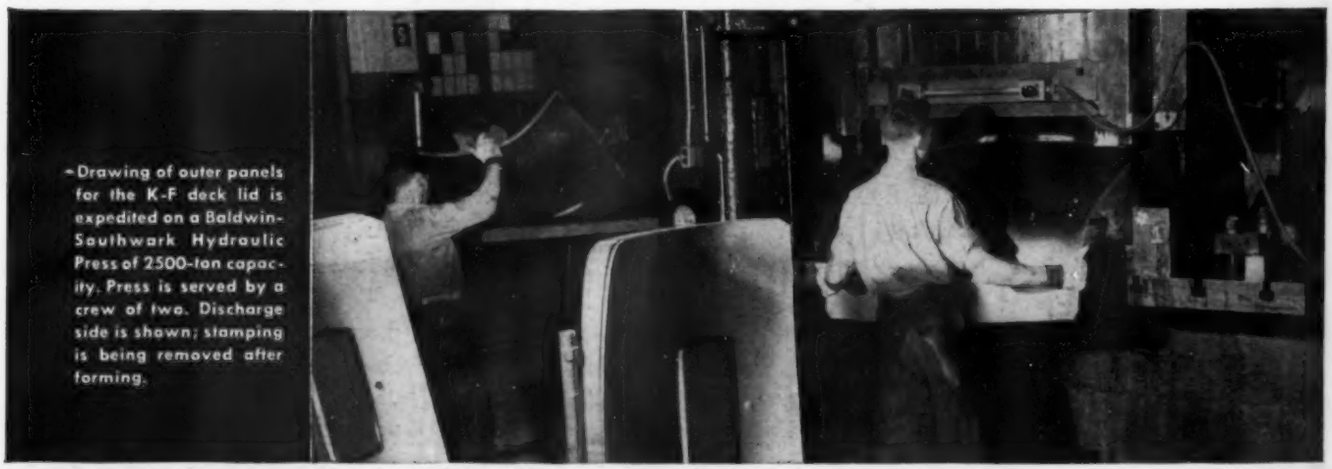
BALDWIN HYDRAULIC PRESSES

help accelerate panel production for Kaiser-Fleetwings, Inc.

In the Kaiser-Fleetwings, Inc. Plant at Bristol, Pennsylvania, Baldwin presses are helping to solve today's big problem of cutting manufacturing costs.

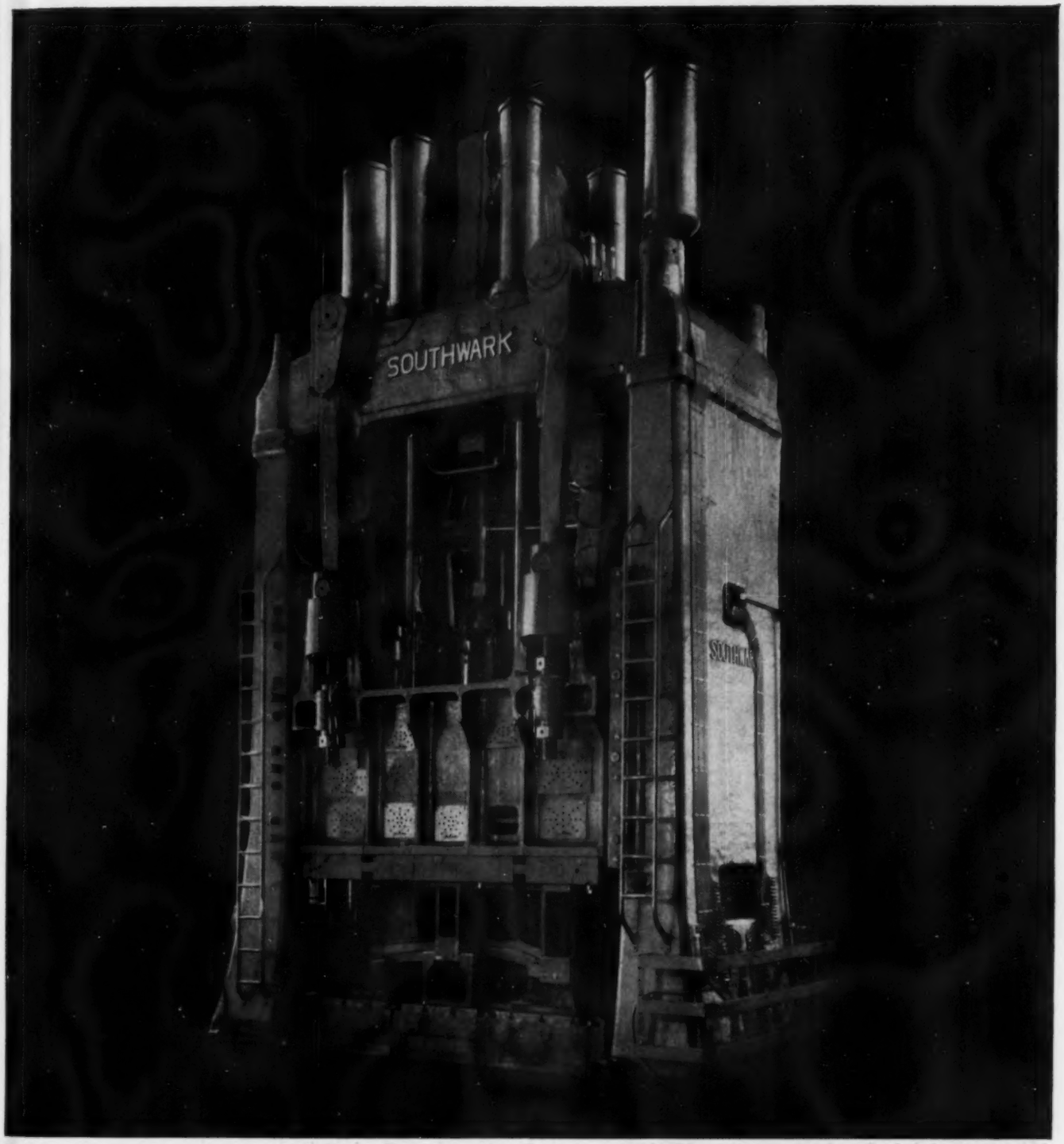
The press illustrated is one of the Baldwin-Southwark units installed and operating. This triple-action press of 750-ton capacity is currently producing inner panels for Kaiser-Frazer deck lids. Outer panels are handled on a 2500-ton capacity unit.

With labor and material costs rising, the only real opportunity for holding the price line is through more efficient production. A Baldwin press can help you to turn out *more* products, with *fewer* rejects, at *lower* cost. The nearest District Office will give you full details.



Drawing of outer panels for the K-F deck lid is expedited on a Baldwin-Southwark Hydraulic Press of 2500-ton capacity. Press is served by a crew of two. Discharge side is shown; stamping is being removed after forming.

Drawing and trimming K-F deck lid inner panels on a 750-ton Baldwin-Southwark Triple-action Hydraulic Press. Both draw and trim dies are set up on the same press. The unit is served by a crew of four, two on each side. Here the finished stamping is removed, and discharged onto a gravity conveyor.



BALDWIN

HYDRAULIC PRESSES

The Baldwin Locomotive Works, Philadelphia 42, Pa., U. S. A.
Offices: Boston, New York, Philadelphia, Birmingham, Houston, St. Louis, Chicago, Cleveland, Pittsburgh, San Francisco, Seattle, Washington. In Canada: Baldwin Locomotive Works of Canada, Ltd.

HANNIFIN

HYDRAULIC CYLINDERS

SUPERIOR DESIGN! An improved type of high pressure hydraulic cylinder. Full 4-ring piston construction. Universal end caps.

PRECISION CONSTRUCTION. *TRU-BORED* and honed. Long-life "leak-proof" operation. Parts interchangeable, standardized.

COMPLETE LINE. 12 bore diameters, 1" to 8"; any length stroke. 11 standard mounting styles. Available with adjustable cushions. 1500 lbs. pressure standard. Higher pressures and larger sizes on order.

(*Below*) Hannifin Hydraulic Cylinders contribute to the precision performance of MORRIS MACHINE TOOL COMPANY'S 12 spindle "MOR-SPEED" high production machine for performing reaming operations on automotive cylinder blocks

HONED Tru Bored

a Plus Value

...IN THE MACHINES YOU *Use!*

IT'S a better machine, when it's equipped with HANNIFIN *TRU-BORED* Cylinders. You get smooth, full-power performance; long lasting maintenance-free service. Look for the name "HANNIFIN"; it's a mark of QUALITY and a sign of modern engineering!

...IN THE PRODUCTS YOU *Build!*

YOU know it's *good* and your customers know it, too, when you use precision-built Hannifin Cylinders in products you build. Take advantage of the service Hannifin offers! Cylinders engineered to fit your requirements. Prompt, dependable delivery.

ASK FOR A COPY OF THIS BULLETIN!

- Everything you want in Hydraulic Cylinders! A big 52 page catalog listing standard Hannifin Cylinders, complete with specifications, dimensions, and engineering data. It's easy to get the cylinder that's *specially* designed for your job right out of Hannifin's *standard* line. Ask for Bulletin 110-X.

HANNIFIN CORPORATION

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AIR CYLINDERS • HYDRAULIC CYLINDERS • HYDRAULIC PRESSES
PNEUMATIC PRESSES • HYDRAULIC RIVETERS • AIR CONTROL VALVES

Nationwide Sales and Service

OU have answered the long-felt need for a SMALL PRESS that does a BIG JOB"

ACE SODA FOUNTAIN USES A KRW 100-TON PRESS TO BLANK AND FORM STAINLESS STEEL TOPS . . . RELEASING LARGER EQUIPMENT FOR OTHER WORK.

Ace Soda Fountain says further— "We are well satisfied with the performance of your model 37V Hydraulic Press. Its versatility, in the various blanking and forming operations which we do, exceeds the claims made in your specifications."

Many parts of this Ace Soda Fountain, including the top, are blanked and formed on the KRW Press shown.

INDUSTRY HAS PROVEN that, on a large percentage of ...rage blanking and forming work, large, heavy-tonnage presses, with ...r high initial and operating costs are unnecessary. The experience of ...ny KRW users has demonstrated this fact beyond any doubt.

KRW Hydraulic Presses are highly adaptable . . . they are available in ...nages from 25 to 100 . . . in varying bed widths and lengths. Because they ... hydraulically operated and not mechanically driven, they are extremely ...et and vibrationless in operation. First cost is very low, operating costs ... still lower. In one instance, the purchase price of a KRW Press was ... than the foundation cost of heavier equipment originally planned.

Let us know your needs, we'll show you how to save ...oney in a big way. Deliveries in 8-10 weeks on large ...sses, one week on standard presses.

AME YOUR NEEDS! MAIL COUPON TODAY!

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11

K. R. WILSON, 215 Main St., Buffalo 3, N. Y.

Please send complete information on New KRW 100-ton Hydraulic Presses.

Name .....

Address.....

City and Zone..... State.....

MAKE HARD SET-UPS
UP TO 50% LES

Kearney & Trecker's New Milling Machines with Built-In Chuck-Type Table Use Standard Tools to Set-Up Any Workpiece — Eliminate Expensive Workholding Fixtures.

The secret of using Kearney & Trecker's new milling machines with Built-In Chuck-Type Table lies in especially designed interchangeable standard tools or accessories that readily adapt themselves to any set-up. Thus the Built-In Chuck-Type Table actually eliminates the need for *costly* workholding fixtures.

You'll find hard-to-hold workpieces with irregular or curved contours easily clamped and leveled using combinations of spring and screw jacks and various styles of vise jaws which fit on standard bases. Similarly a variety of bumper-stops may be used as the work demands.

In actual shop tests, workpieces both large and small, simple and complex, have been set up and machined in fractions of the time formerly required. What's more, the simplicity of set-ups has materially reduced operator fatigue and provided greater rigidity plus more accurate finished results.

Kearney & Trecker milling machines with the Built-In Chuck-Type Table are available now in three standard working ranges, plain or vertical styles: (1) 34″ power table feed — Models 2K, 3H and 20 CSM. (2) 42″ power table feed — Models 3K, 4H and 30 CSM. (3) 50″ power table feed — Models 4K, 5H and 50 CSM. Accessories include screw and spring jacks, bumper stops and a variety of interchangeable, reversible vise jaws with hard, soft, plain, serrated, flat or radius faces depending on the surface or material to be clamped.

If you are planning on new milling machine equipment in your shop — it will pay you to get complete details on the new Kearney & Trecker milling machines with the Built-In Chuck-Type Table. Contact your nearest Kearney & Trecker Office or Dealer, or write direct to Kearney & Trecker Corporation, 6784 W. National Ave., Milwaukee 14, Wisconsin.

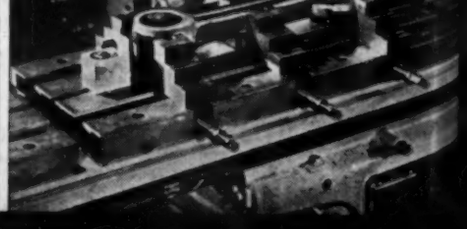
KEARNEY & TRECKER
MILWAUKEE
MACHINE TOOLS

HOW INTERCHANGEABLE TOOLS FOR CHUCK-TYPE TAB

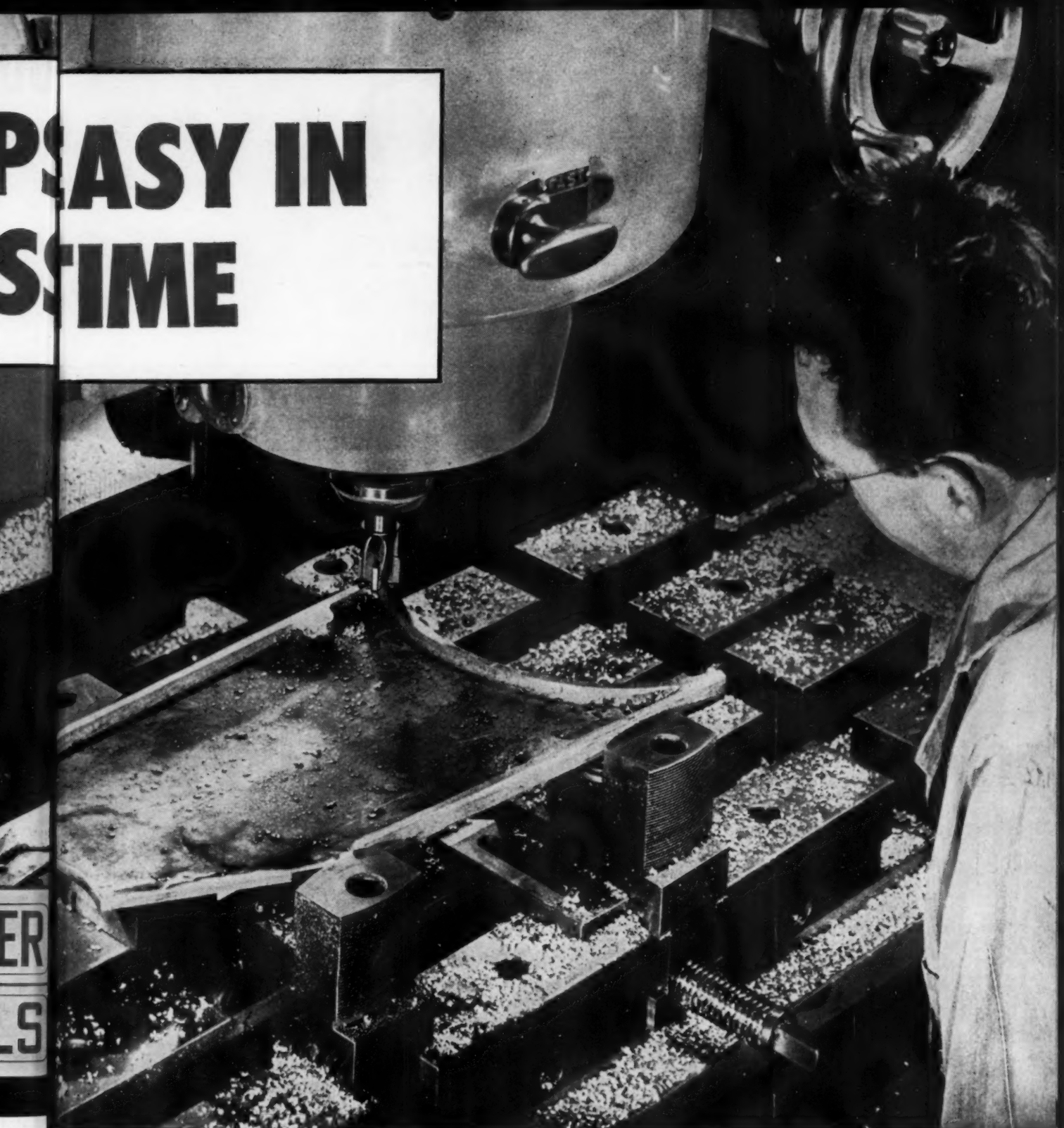
Standard tool bases quickly position in large specially designed table slots. Reversible vise jaws rigidly bolt to bases.

Variety of standard bumper-stops available to fit almost any set-up. Note different heights and positions possible.

Here's how quick positioning of ba… mounting of jaws and single bump… stop combine to make fast, rigid set-…



PS EASY IN S TIME

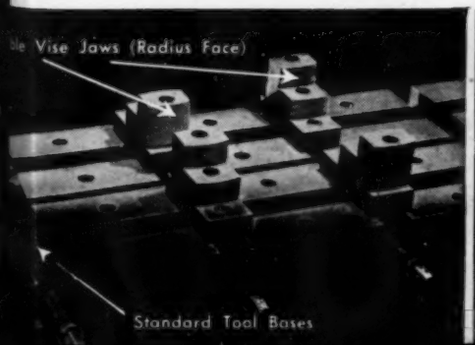


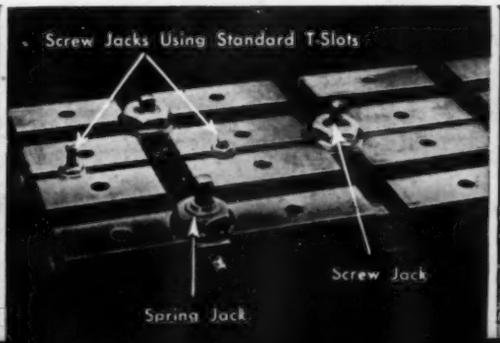
MAKE EASY SET-UPS—ELIMINATE EXPENSIVE FIXTURES

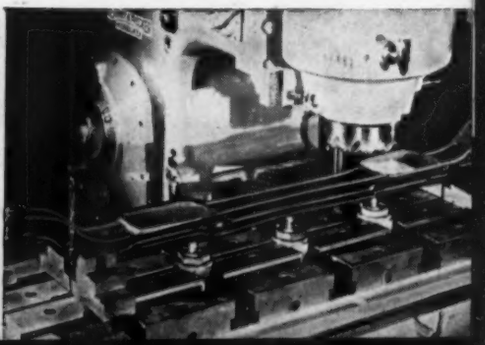
rved surfaces on workpieces are eas- clamped using radius-face, reversible e jaws rigidly bolted to standard bases.

You get quick, accurate leveling on any workpiece using a variety of screw or spring jacks. Note various positions.

Here's typical, fast, simple set-up for carbide milling an axle part using both screw jacks and serrated vise jaws.





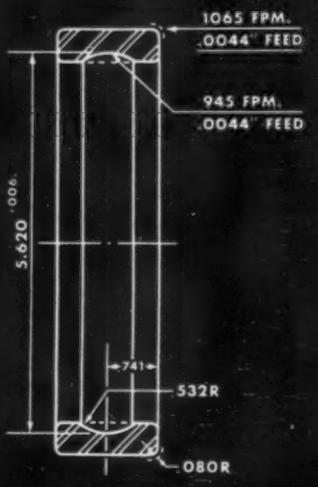


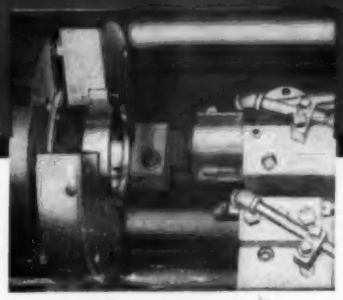
YOU CAN CUT YOUR TURNING COSTS

if

your lathes have the Power, Rigidity and Spindle Speeds to use Carbide Tools effectively.

for instance . . . *Note the Power and Speed required to form the groove and chamfer the O. D. of this Outer Bearing Race, made of 52100 steel,* IN 3½ SECONDS CUTTING TIME. *The 16" Fay Automatic Lathe transmits in excess of* 51 HORSEPOWER. *The forming cut is made at* 945 FPM WITH .0044 FEED; *the chamfering cut at* 1065 FPM WITH .0044 FEED.





Manufacturer of: Universal Turret Lathes · Fay Automatic Lathes · Automatic Double-End Milling and Centering Machines · Automatic Thread Grinders · Optical Comparators · Automatic Opening Threading Dies and Chasers · Ground Thread Flat Rolling Dies

YOU CANNOT COMPETE with production like this with machines less powerful, less rigid.
Jones & Lamson Lathes guarantee your investment.
They anticipate the future in metal turning.
They are built with great reserves of ruggedness.
They are powered to meet even more than today's requirements for the effective use of carbide tools.
Let a Jones & Lamson engineer study your turning operations. He will be able to make recommendations that will improve your profit picture. He has for others.

JONES & LAMSON MACHINE COMPANY, Springfield, Vermont, U. S. A.

Jones & Lamson Lathes

ARE POWERED FOR CARBIDE

Grind Faster... Grind Cooler
Grind Longer... Grind for Less
with
32 ALUNDUM®
GRINDING WHEELS
NORTON
GRINDING WHEEL
NORTON COMPANY
WORCESTER, MASS.
8x1x1¼
32A46-K5VBE
Yes— you really can grind for less with 32 ALUNDUM wheels.
Why?— Because 32 ALUNDUM abrasive is entirely different from any other abrasive — made differently by a unique Norton process which you'll find described on the other side of this page.

NORTON ABRASIVES

Here's why you can grind for less

with the Sensational 32 ALUNDUM Grinding Wheels

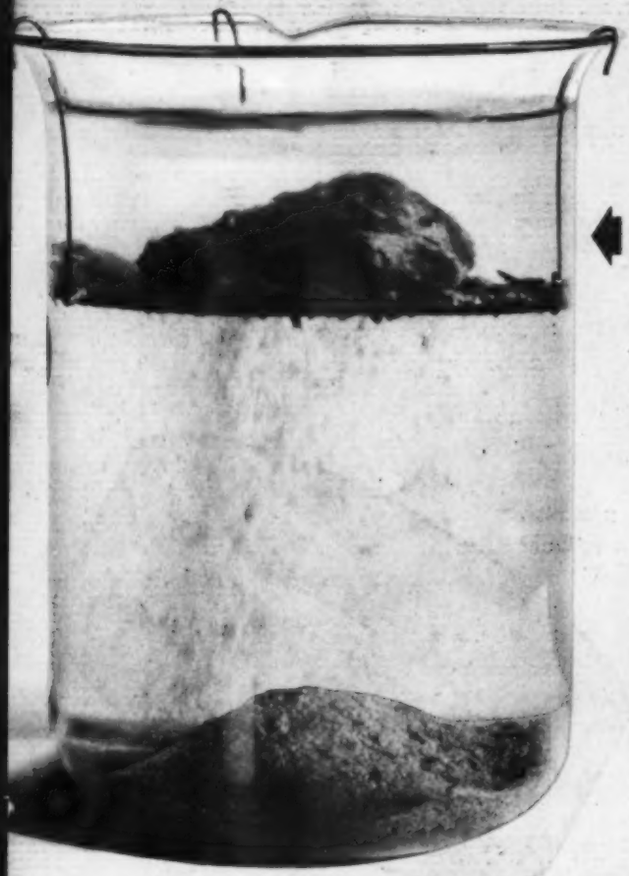
BY an ingenious Norton-developed and patented process the grains of 32 ALUNDUM abrasive form in the electric furnace in a fluid matrix. This allows each grain to grow into a single, complete crystal—strong in shape and *with many sharp points on all sides.* Result: a faster and cooler cutting action.

And the matrix serves a dual purpose for it also absorbs the impurities present in the melt. Thus 32 ALUNDUM abrasive is over 99% pure fused alumina—*more actual cutting material than in any other abrasive.* Result: less dressing, longer wheel life.

By a complicated chemical process the matrix is dissolved away and the released grains are then washed and screened to size. *No crushing is necessary.*

That this sharper, purer abrasive really cuts grinding costs is being demonstrated every day in thousands of plants.

Are you taking advantage of 32 ALUNDUM grinding wheels?



A Demonstration

Here you see 32 ALUNDUM abrasive as it comes from the electric furnace—the individual crystals imbedded in the matrix in which they "grow." As this matrix is dissolved the grains are released—ready for screening to size.

See It Yourself

You'll find this demonstration and many more in the new Norton motion picture on 32 ALUNDUM abrasive. Arrange for a showing of this 16mm. Kodachrome sound film in your plant—no obligation.

NORTON ABRASIVES

NORTON COMPANY, WORCESTER 6, MASS.

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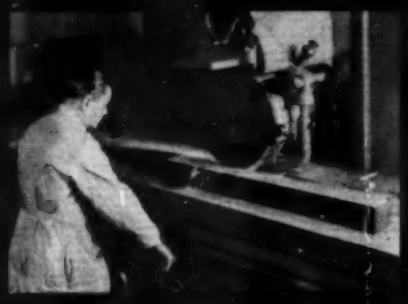
Use "32" for

TOOL GRINDING



SURFACE GRINDING

INTERNAL GRINDING

CYLINDRICAL GRINDING

CENTERLESS GRINDING

Want to see some sharp drops in metal working costs?

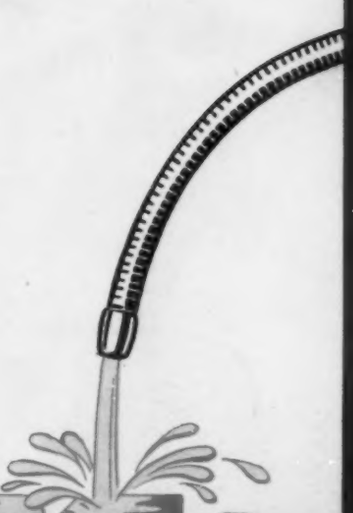
Just keep a sharp eye on production when you put Cimcool in your machines. It's a revolutionary new cutting fluid—a *chemical emulsion*—that cuts costs three important ways:

1. Cimcool prolongs tool life (and that means less down time) because of its *chemical lubricity.*

2. Faster speeds are possible because Cimcool cools faster, through a unique physical change in the cutting fluid itself. Tools and chips actually stay cool to the touch.

3. Cimcool costs less than old-fashioned cutting fluids because it lasts longer. It isn't subject to rancidity. Its low surface tension and low adhesion to work and chips virtually eliminates carry off.

CIMCOOL DIVISION OF THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO, U. S. A.



CIMCOOL *for* 85%

Trade Mark Reg. U. S. Pat. Off.

OF ALL METAL CUTTING JOBS

NIAGA

America's Most Complete Line of

MACHINES AND TINNERS' TOOLS

FOR PLATE AND SHEET METAL WORK

NIAGARA
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NIAGARA
Ring and Circle Shear

NIAGARA MACHINE & TOOL WORKS, BUFFALO 11, NEW YOR DI

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RK

The tinners tools and machines shown on these pages are just a few of the hundreds included in the complete Niagara line. There is an economical, productive and reliable press, shear, machine and tinners' tool for every requirement for sheet metal job shops, plant maintenance departments and high production plants. Niagara hand, foot and power operated machines offer low first cost, low production cost and low maintenance cost. Write for catalogs.

NIAGARA
Combination
Bench Machine

NIAGARA
Lever Punch & Shear

NIAGARA
Groover

NIAGARA
Electric Combination
Machine

NIAGARA
Folder

OR DISTRICT OFFICES — NEW YORK • CLEVELAND • DETROIT

use a GE motor starter

These G-E combination starters give your motors money-saving protection—three ways. Providing short circuit, overload and undervoltage protection, they save you installation costs because fuses, disconnect switch and magnetic starter are all in one unit. Whatever your operating condition, there's a combination starter to do the job. See bulletin GEA-3571A for details.

MORE G-E STARTERS General Electric has a complete line of motor starters, manual or magnetic, full- or reduced-voltage, reversing or nonreversing from 1 to 1000 horsepower ratings. All G-E starters come in a variety of enclosures. For more information on all G-E starters, including those shown below, ask your nearest G-E office for catalog GEA-642. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

CR1061 G.E.'s smallest, most inexpensive starter for manual control of single-phase, ½-hp motors.

CR1062 Sturdy, low-priced starter for manual control of single and three-phase motors up to 7½ hp.

CR1034 A simple, manual, reduced-voltage starter for preventing voltage dips and shock from too sudden starting of motors ranging from 5 to 200 hp (four sizes).

Polishing of "Mix-All" food and drink containers is the job of this unique, automatic, rotary table-type buffing machine built by the Square Deal Machine Company of Los Angeles for Western Die Casting Company. Continuity of operation is assured because combination starters, in one compact unit, protect your motors from short circuits, overloads, and undervoltages.

GENERAL ELECTRIC

Threaded Holes FOR SALE!

Tap users rightly think in terms of the "cost per threaded hole".

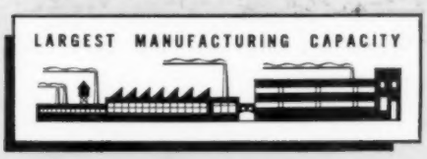
Thus they get a true measure of tap value which is more than the cost of the tap itself. It includes getting the right tap for the job in the quickest possible time. It includes accuracy and long life of the tap while on the job.

Here are some of the PLUS values that are behind all taps with the GTD trademark:

SERVICE from the country's leading distributors who handle "Greenfield" tools.

ON-THE-SPOT HELP on threading problems from the "Greenfield Man" in your territory.

BUILT-IN VALUES that come from the industry's largest research staff of threading engineers.



PERFORMANCE that comes from a product made in the largest, most modern threading tool plant in the world.

That's why . . . when you buy . . . you get more for your money when you say "Greenfield"

GTD GREENFIELD

World's Leading

THREADING TOOLS

When you buy GTD "Greenfield", you get a quality of product that comes from the world's largest, most modern threading tool plant and its research staff of threading engineers—PLUS SERVICE from the leading distributors and GTD "Greenfield's" field men in every industrial center.

GREENFIELD TAP and DIE CORPORATION GREENFIELD, MASSACHUSETTS

Precision THREADING TOOLS

GEOMETRIC

STYLE DS Convertible Self-Opening DIE HEAD

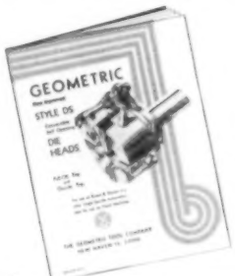
Here is precision plus!

Geometric's famous new improved Style DS Convertible Self-Opening Die Head offers precision threading in not just one, but in 4 different ways.

This versatile tool can be used as a (1) Pull-off Trip for automatics, (2) Outside Trip for automatics, (3) Pull-off Trip for hand machines or (4) Outside Trip for hand machines. The changes can be made quickly and easily without removing the head from the machine and without the necessity of getting new parts or removing or mutilating existing parts.

Made of special alloy steel, hardened and ground throughout, the DS head is a light but durable tool, designed to give precision performance over a long period of time. Unusually sensitive, the DS is especially recommended for cutting fine pitch threads of short lengths. It operates with perfect ease and accuracy at speeds up to 5,000 R.P.M. The new DS is built in six sizes with a cutting range from 1/16" to 1 3/4", and its chasers are interchangeable, size for size, with the old-style heads. *Write today for the complete free story on this precision plus die head! No obligation of course!*

USE COUPON FOR FREE INFORMATIVE BULLETIN NO. DS-3



THE GEOMETRIC TOOL COMPANY
7 Valley Street
New Haven 15, Connecticut

Please rush me a copy of Bulletin No. DS-3 which describes in detail the new improved Geometric Style DS Convertible Self-Opening Die Head.

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*Firm*_____

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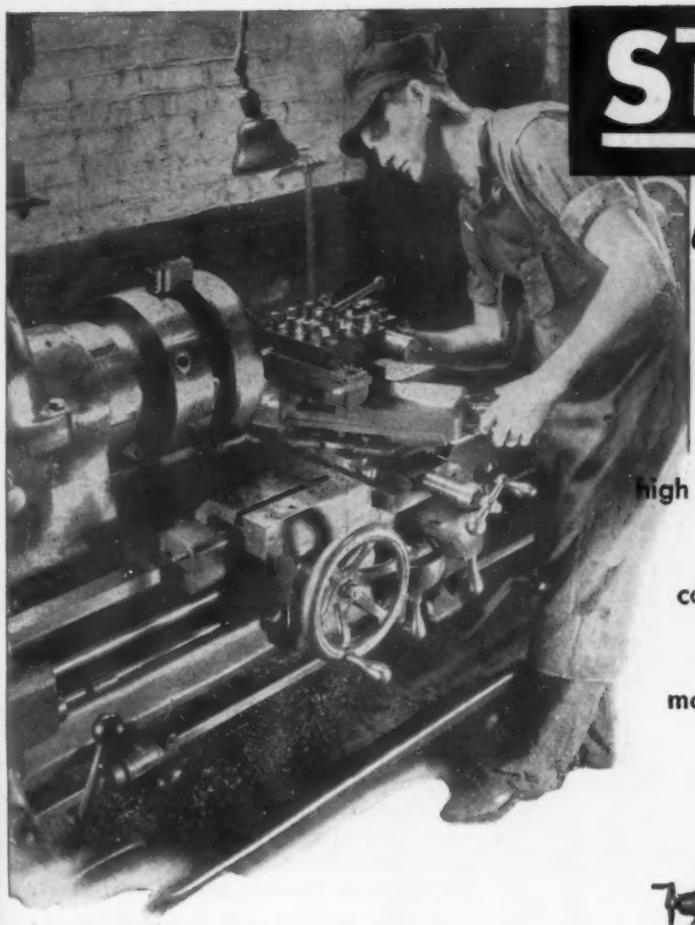
GEOMETRIC

TO

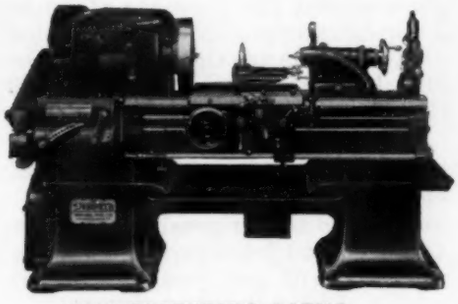


SPRINGFIELD

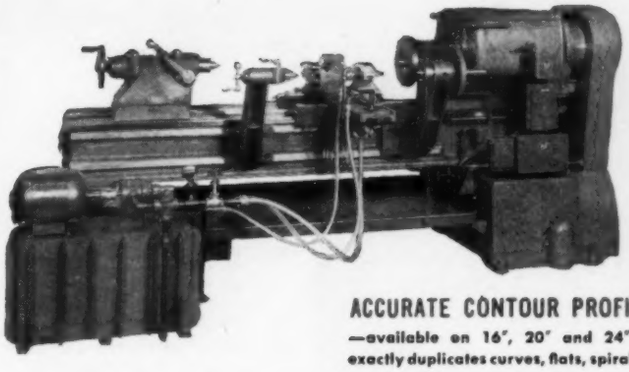
Geared Head LATHES

Springfield builds a complete line of precision, high quality, geared head lathes. Every type of lathe built by Springfield is especially designed and constructed to meet all the requirements of modern tooling, and to retain extreme accuracy through many years of full capacity production.

Write for catalogs and detailed specifications.

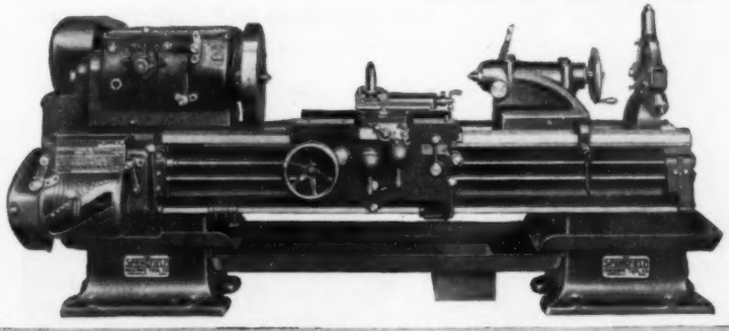


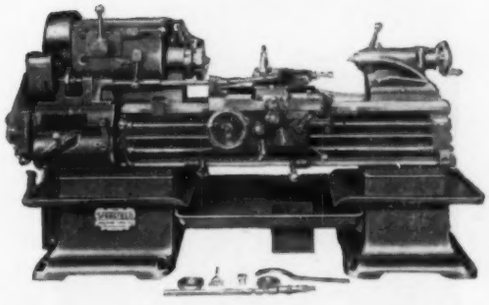
MANUFACTURING LATHE
—with unusually wide applications; capable of accurately turning, boring and facing.



ACCURATE CONTOUR PROFILING
—available on 16", 20" and 24" lathes; exactly duplicates curves, flats, spirals, cams.

SUPER DUTY LATHES
—made in 20" and 22" sizes; equipped with 16-speed geared heads.





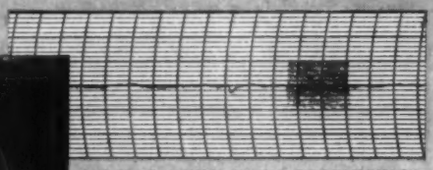
TOOL ROOM LATHES
—made in all sizes including 24"; equipped with lead screw reversing mechanisms.

THE SPRINGFIELD MACHINE TOOL COMPANY
SPRINGFIELD, OHIO, U. S. A.
GENERAL DISTRIBUTORS: BRYANT MACHINERY & ENGINEERING COMPANY, 400 WEST MADISON ST., CHICAGO 6
Exclusive Representatives in All Principal Cities

PUT IT ON THE BLANCHARD

MAKE BETTER, LONGER-LASTING PARTS WITH FINER, FLATTER SURFACES

-Eliminate Lapping!



SURFACE FINISH CHART OF BLANCHARD-GROUND PIECE, USING BRUSH SURFACE ANALYZER WITH ATTENUATOR SET AT .01. SURFACE HAS ROUGHNESS VALUE OF ONLY 2 MICRO-INCHES.

3″ Valve Plate for Hydraulic Pump. Hardened Steel.

Checking flatness of Blanchard-ground surface with optical flat. Parallel lines show surface is flat within ½ light band. (5.8 millionths of an inch.)

Cast Iron End Plate for Refrigerator Compressor.

The optical flat shows this Blanchard-ground surface flat within ½ a light band.

Checking flatness of production-lapped piece received from customer. Note the variation from flatness as shown by the curved lines.

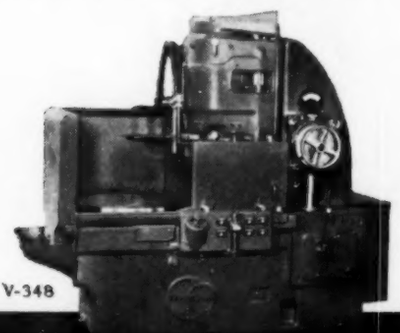
As you know, the operation of lapping charges the worked-upon surfaces with lapping grit. The presence of this lapping grit — which is practically impossible to remove — lowers the ability of the lapped surfaces to resist wear.

Blanchard research has perfected a method of flat surface grinding — using only their standard Blanchard Grinders — whereby extremely fine finishes *and* extreme flatness can now be produced in *quantity production*. The illustrations show what is being accomplished. Lapping and all other subsequent finishing operations are eliminated.

Such Blanchard-ground parts show useful life increase of up to 5 times that possible with lapped parts. Joints are tighter and withstand pressures as high as 3,000 lbs. oil per sq. in. without leaking.

If you have critical flat surfaces that require extremely fine finishes, close sizing and extreme flatness — and would like to produce them in the best and least expensive manner — it will pay you to get the advice of Blanchard engineers.

Simply send us the data, with samples if available and practical. This Blanchard Service is of course free and does not obligate you.

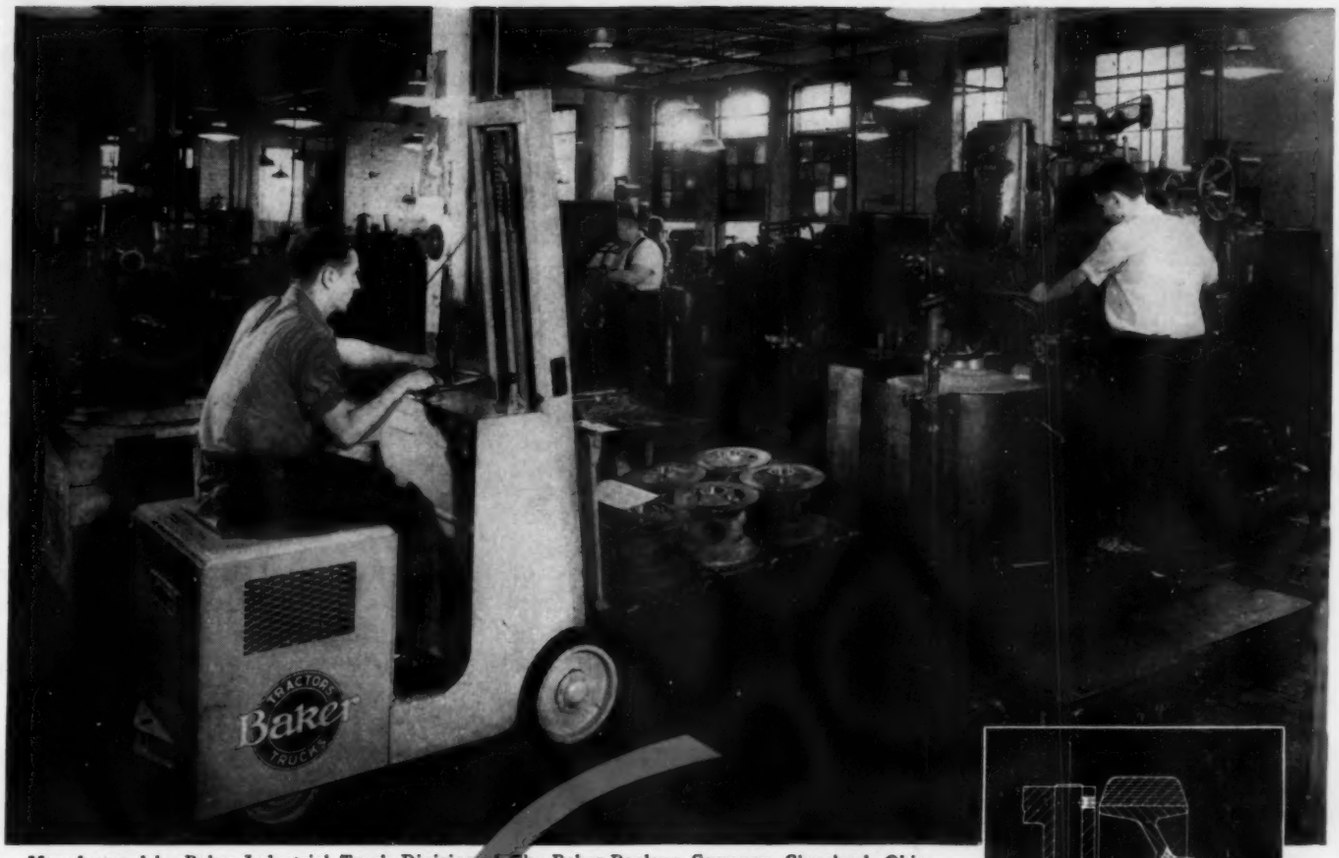


V-348

BLANCHARD

The **BLANCHARD** MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.



Manufactured by Baker Industrial Truck Division of The Baker-Raulang Company, Cleveland, Ohio.

Handles 1000 pound loads quickly and safely on TIMKEN® BEARINGS

Shown carrying a load of castings in a machine shop, the Baker 1,000 pound capacity battery-operated fork truck is equally adept and agile handling any kind of material in any surroundings.

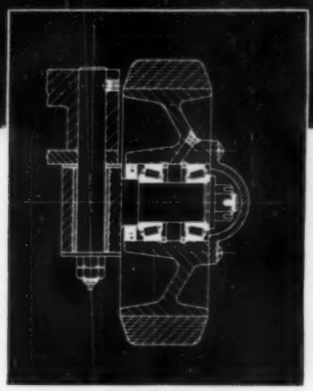
With Timken Tapered Roller Bearings on the drive and steering axles it runs smoothly, maneuvers easily and accurately under full load.

Frictionless operation saves power, prevents wear, while the Timken Bearing's ability to carry all loads — radial, thrust or both together in any combination increases endurance, reduces maintenance, extends truck life.

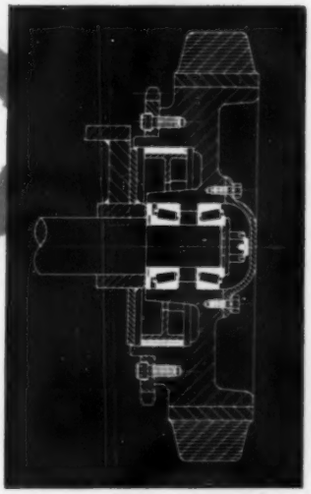
No other bearings can give you all the advantages you get with Timken Bearings with 49 years of engineering, metallurgical and manufacturing experience behind them.

Make sure you have Timken Bearings in the machines you buy. Look for the trade-mark "TIMKEN" on every bearing that goes in the machines you make. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address "Timrosco".

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS



Application of Timken Bearings in steering axle wheel.



Application of Timken Bearings in drive axle wheel.

NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◎ AND THRUST →◎← LOADS OR ANY COMBINATION →✳←

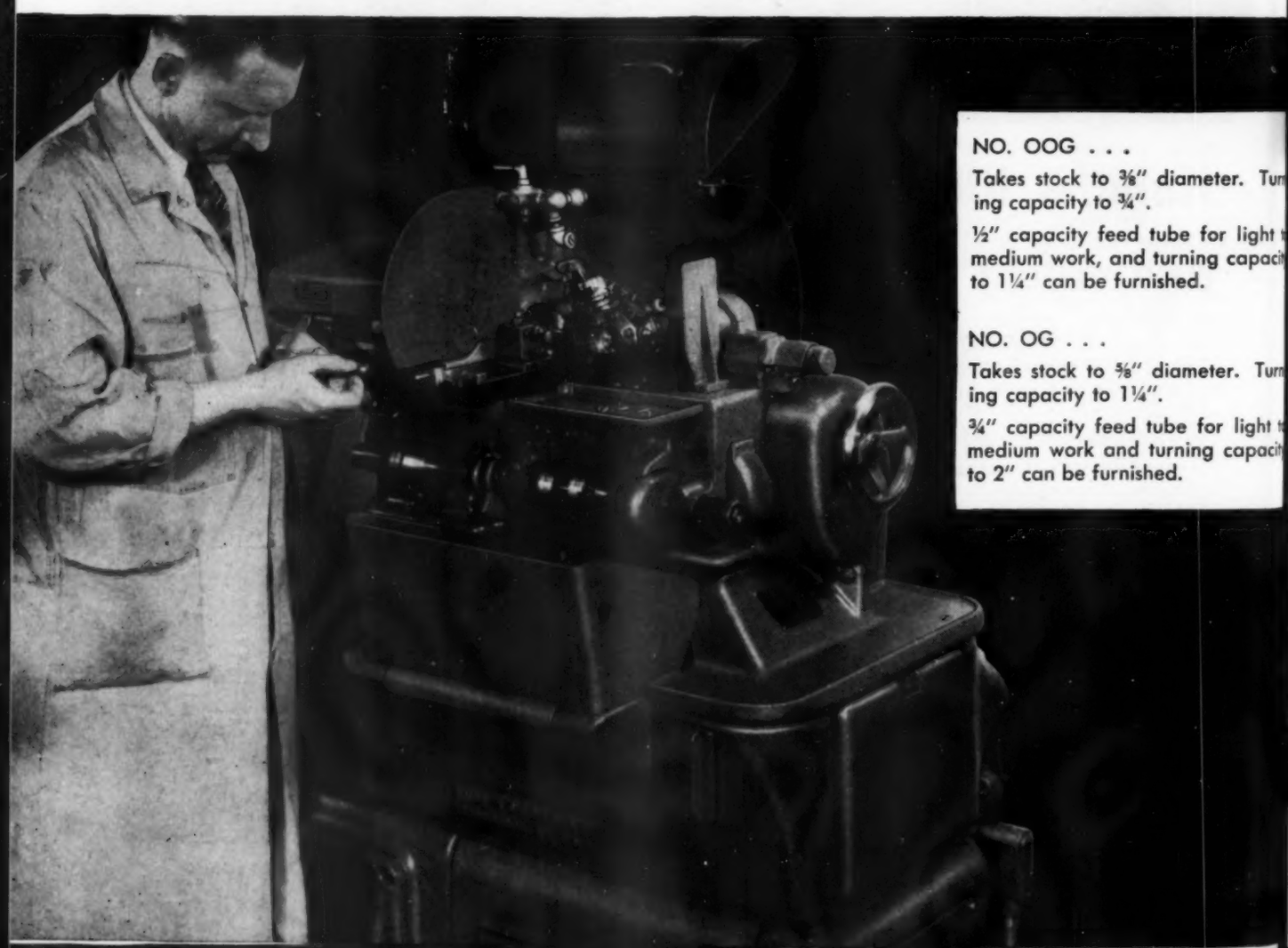
New Design

"OOG" AND "OG" AUTOMATIC SCREW MACHINES

IMPROVEMENTS AND REFINEMENTS have been made in these Automatic Screw and Automatic Cutting-Off Machines to increase their efficiency and to permit the maintenance of closer limits, finer finish and more uniform production.

Spindle is positively driven at all speeds and is provided with 196 two-speed combinations including a wide range of high to low speed ratios. This wide selection of ratios makes possible the use of correct speeds for threading without limiting the selection of efficient high speeds for forming, drilling and similar operations. Equal cutting efficiency is obtained on all materials ranging from tough alloy steels to free-cutting plastics and on the widest range of work diameters.

Numerous design and construction details combine to shorten set-up time and a wide assortment of available attachments further increases overall value in terms of investment. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.



NO. OOG . . .

Takes stock to ⅜" diameter. Turning capacity to ¾".

½" capacity feed tube for light to medium work, and turning capacity to 1¼" can be furnished.

NO. OG . . .

Takes stock to ⅝" diameter. Turning capacity to 1¼".

¾" capacity feed tube for light to medium work and turning capacity to 2" can be furnished.

196

LOW

BROWN &

Featuring

196 two-speed combinations of spindle speeds with positive chain drive to spindle

BROWN & SHARPE
OOG AUTO. SCREW MACHINE SPINDLE SPEEDS

SPINDLE CHANGE GEARS	RATIO CHANGE GEARS	UPPER / LOWER	LOW SPEED	OPPOSITE DIRECTION FRONT	SAME DIRECTION REAR
1st gear	28 31 35 39 42 46 49 53 56 60 64 67 70 73				
2nd gear	67 64 60 56 53 49 46 42 39 35 31 28 25 22				
73-22	6050 5780 5255 4700 4295 3930 3680 3360 3120 2800 2520 2345 2100 1890				
70-25	5780 5520 5020 4490 4100 3750 3510 3210 2980 2670 2405 2240 2005 1805				
67-28	5520 5270 4790 4290 3920 3585 3355 3065 2845 2550 2300 2140 1915 1725				
64-31	5270 5035 4580 4100 3745 3425 3205 2930 2720 2435 2195 2045 1830 1645				
60-35	5035 4810 4375 3915 3575 3270 3060 2795 2595 2325 2095 1950 1745 1570				
56-39	4810 4595 4180 3740 3415 3125 2925 2670 2480 2220 2000 1865 1670 1500				
53-42	4595 4390 3990 3575 3265 2985 2795 2555 2370 2120 1910 1780 1595 1435				
49-46	4390 4195 3815 3415 3120 2855 2670 2440 2265 2030 1830 1705 1525 1370				
46-49	4195 4010 3645 3265 2980 2725 2550 2330 2165 1940 1745 1630 1460 1310				
42-53	4010 3830 3485 3120 2850 2605 2440 2230 2070 1855 1670 1560 1395 1255				
39-56	3830 3660 3330 2980 2725 2490 2330 2130 1980 1775 1595 1490 1335 1200				
35-60	3660 3495 3180 2850 2605 2380 2230 2035 1890 1695 1525 1425 1275 1145				
31-64	3495 3340 3040 2725 2490 2275 2130 1945 1805 1620 1455 1360 1220 1095				
28-67	3340 3190 2905 2605 2380 2175 2035 1860 1725 1545 1390 1300 1165 1045				
25-70	3190 3050 2775 2490 2275 2080 1945 1775 1650 1480 1330 1245 1115 1000				
22-73	3050 2915 2650 2380 2175 1985 1860 1695 1575 1415 1270 1190 1065 955				
RATIO OF HIGH TO LOW SPEED	1.6 1.8 2.2 2.6 3 3.6 4.1 5 5.5 6.5 7.9 9.1 11 13				

SPINDLE RUNNING FAST — BACKWARD / FORWARD — CROSS / OPEN — DRIVING SHAFT BELT

*THESE COMBINATIONS NOT TO BE USED IN OPPOSITE DIRECTION

196 TWO-SPEED COMBINATIONS

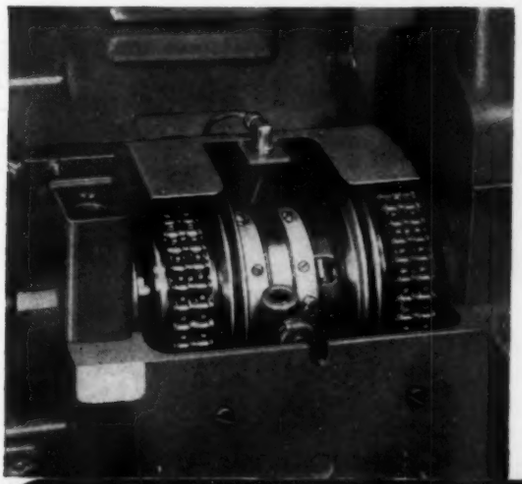
are provided with a range from 6050 to 50 R.P.M. on the "OOG," and a range of 4230 to 35 R.P.M. on the "OG." Approximate ratios of high to low speeds range from 1.6:1 to 13:1 except for highest and lowest high speeds where ratios range from 1.6:1 to 11:1.

HIGH SPEEDS EASILY CHANGED

by one pair of pick-off gears. Gears quickly withdrawn from splined shafts by loosening clamp nuts, releasing washers. Replaced by another set from storage compartment in door. One set of 16 gears provides not only 16 high speeds, but also all ratio changes.

LOW SPEED RATIO AND DIRECTION

equally easy to change. Selecting the direction of low speed is done merely by placing lower of two change gears on proper one of two centers. Driving sprockets and spindle driving chains remain untouched.



CHAIN-DRIVEN FULL-ANTIFRICTION-BEARING SPINDLE

Positive drive of spindle by roller chains at all speeds insures required power throughout full range of operations within capacity of machine. Spindle readily removable. End thrust is taken by preloaded, precision ball bearings.

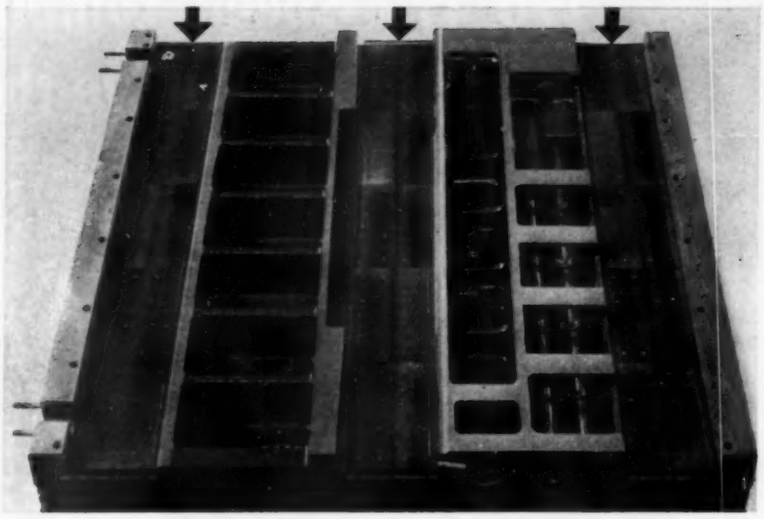
SHARPE

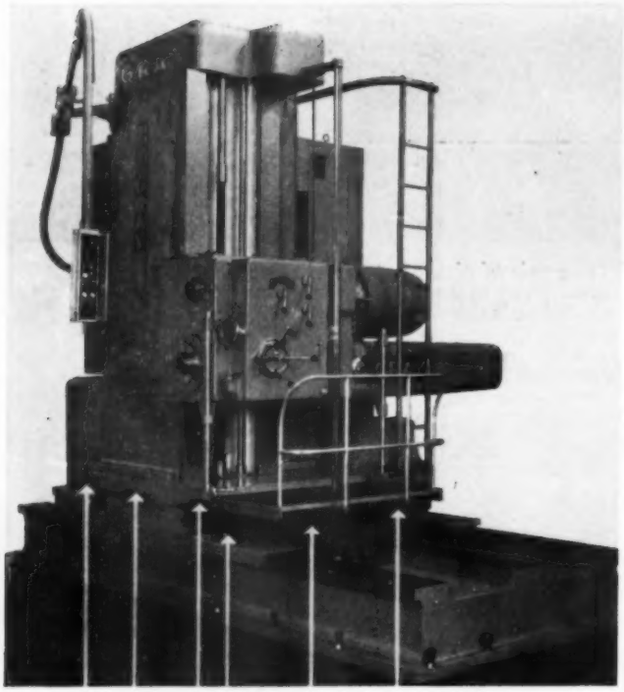
B·S

NON-METALLIC WAYS

originated and perfected by the

G. A. GRAY *Co.*





GRAY NON-METALLIC WAYS

characterize GRAY

HORIZONTAL BORING
DRILLING *and* MILLING MACHINES

Cutting and scoring of these vitally important guiding surfaces is thus practically eliminated. The value of this epoch-making development is evident when you consider that a standard column and head weighs 25 tons.

Remember

A boring machine is no better than its ways. There is no adequate substitute for the Gray NON-METALLIC WAY.

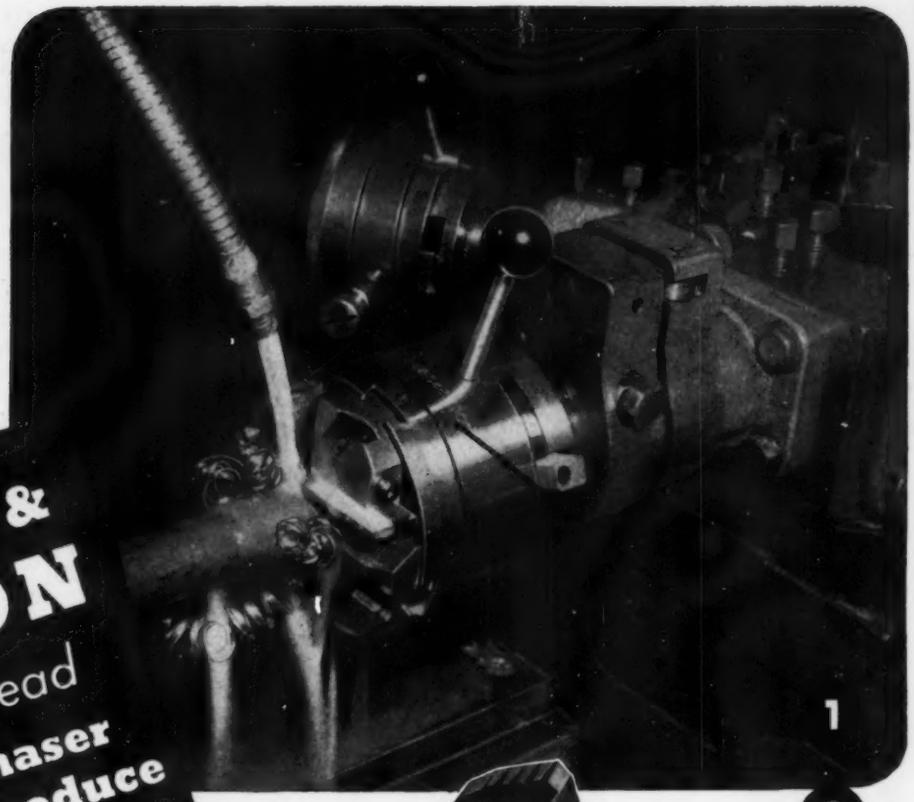
Protected by Patent 2,378,343 and Patent Pending.

The G.A. GRAY *Company*

planers • milling planers
planer type milling machines
horizontal boring machines

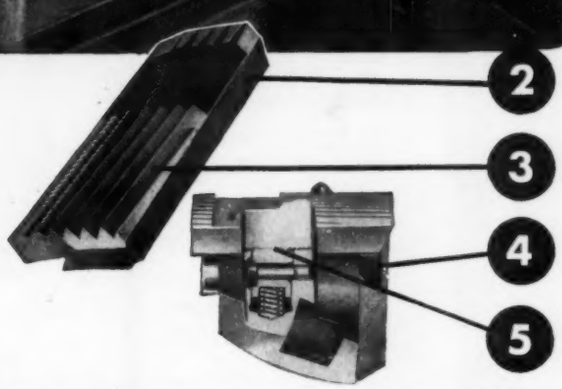
CINCINNATI 7, OHIO, U. S. A.

SOLD IN CANADA BY UPTON, BRADEEN AND JAMES, LTD. • SOLD IN LATIN AMERICA BY MACHINE AFFILIATES



JONES & LAMSON

Ground Thread Tangent Chaser Die Heads Produce Better Threads at lower cost



because

1. They are hardened and ground throughout. The body is lapped on the face and in the dovetail slots. Chaser holder bearing surfaces are lapped into the body.
2. Chasers are guaranteed to produce threads of Class III fit.
3. Exact helix angle is ground into the chasers after hardening.
4. With a single set of chaser holders, any thread, within the rated capacity of the holders can be cut, regardless of helix angle, eliminating the expense and trouble of constantly changing holders for different helix angles.
5. Chasers are set quickly and easily.

If you are interested in greater economy and better quality in threading, write to us (*Department 710*) for complete information about our Die Heads.

Jones & Lamson

AVAILABLE IN STATIONARY & REVOLVING TYPES

TANGENT DIE HEADS

JONES & LAMSON MACHINE COMPANY
Springfield, Vermont, U. S. A.

Manufacturer of: Universal Turret Lathes · Fay Automatic Lathes · Automatic Double-End Milling and Centering Machines · Automatic Thread Grinders · Optical Comparators · Automatic Opening Threading Dies and Chasers · Ground Thread Flat Rolling Dies

THE NEW Van Keuren

0 to 3" LIGHT WAVE MICROMETER

will improve your product...

Hardened, Ground, and Lapped ½" diameter Micrometer Screw. Reads to .00001" Carboloy tipped spindle and anvil.

The
LIGHT WAVE MICROMETER HEAD

A source of dependable Precision for modern machine tool and instrument applications.

•

Price, with calibration chart $75.00

The New 1948 VK Catalog and Handbook No. 34, is a 208 page manual indispensable for engineers, designers, inspectors, toolmakers and machinists. It contains simplified formulas and accurate tables for measuring spur gears, helical gears, splines and worms. New and epoch making formulas and tables are presented for the first time for the exact measurement of 29, 40 and 60 single and multiple start screw threads and worms. It includes a complete resume of American & European screw thread systems, new methods of measuring included angle of screw threads, a new method of inspecting flat ring seal surfaces with light waves, and other valuable information. Price $1.00 each postpaid.

THE Van Keuren Light Wave Micrometer is an instrument of exceptional merit, proven over a period of 15 years. It has enabled hundreds of High School boys and girls to produce and inspect parts to "Hundred Thousandths" of an inch.

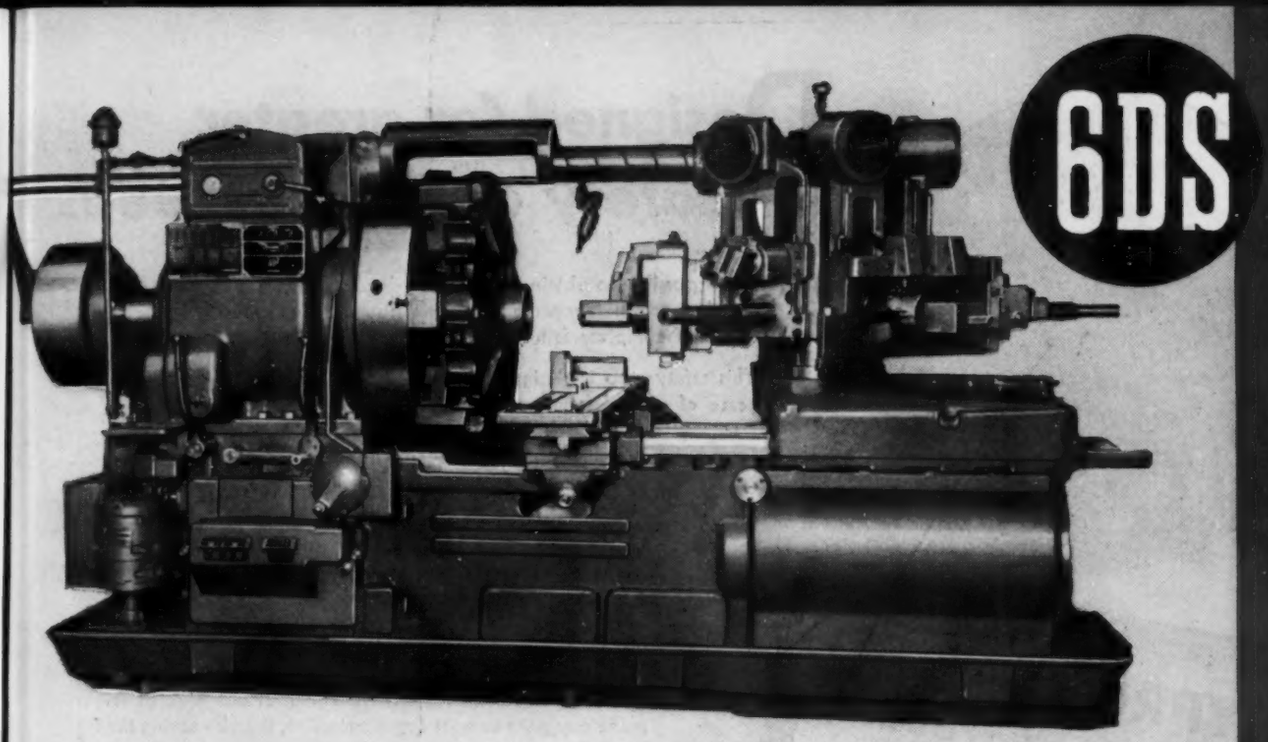
The New 0 to 3" Light Wave Micrometer has a ½" diameter, 40 threads per inch micrometer screw, which can be made with greater accuracy and which has 3 times the wearing surface of an ordinary micrometer screw. It has an 8" diameter micrometer wheel, with .0001" graduations 1/10" apart. It has a non parallax, vernier index which enables readings to be made to .00001". It has an index lock. It has carboloy tipped anvil and spindle. It is a sturdy, yet sensitive instrument which weighs 17 pounds. It is a portable measuring machine, built for "Sustained Accuracy".

The Light Wave Micrometer is not a comparator. No gage blocks are needed and no errors creep in from worn blocks. It is a direct source of dependable precision—fast, accurate and profitable.

THE Van Keuren CO., 176 WALTHAM STREET, WATERTOWN, MASS.

29th YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires



INHERENT *power, rigidity, convenience and versatility in the* P&J 6DS AUTOMATIC TURRET LATHE *assure economy on a wide range of heavy work*

Large work as well as work that is irregular in shape can be handled at high production speeds on this P&J Automatic Turret Lathe. It can be tooled for an unusually wide range of work within its capacity . . . is powerful . . . rigid and because of convenience in control, imposes no unnecessary burden on the part of the operator. As a matter of fact, one operator can handle a battery of these machines without fatigue.

The P&J 6DS model has 4 automatic changes of spindle speed, 3 selective automatic changes of feed, automatic binding of turret following index, direct cross slide action and a motor driven constant rapid traverse motion to cross slide and turret slide.

P&J Methods Engineers are ready to cooperate with you in offering suggestions as to how you can cut costs in the machining of duplicate work, large or small.

CONDENSED SPECIFICATIONS

Swing over bed: 34" (Model 6DSE: 40")

Cross Slide Travel (each way 8½")

Turret Faces: 6

Turret Slide Travel 28"

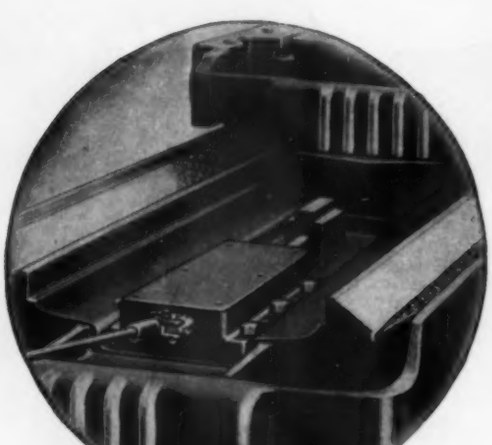
OTHER P&J AUTOMATIC TURRET LATHES

Model 3U (Swing over cross slide: 9½")
Model 4D (Swing over bed: 21")
Model 5D (Swing over bed: 25")
Model 5D-2 (2-spindle) (Swing over bed: 21½", 23", 28")
Model 6DRE (Swing over bed: 34")
Model 8DT (Swing over bed: 36")

For more complete information send for catalogue 1a/25a.

POTTER & JOHNSTON COMPANY
PAWTUCKET, RHODE ISLAND
Subsidiary of
Pratt & Whitney
division Niles-Bement-Pond Company

P&J



Designed for greater safety at higher speeds

It is now possible to obtain a positive hydraulic safety stop and jack to completely protect anything around the machine in case of complete failure of the electrical control.

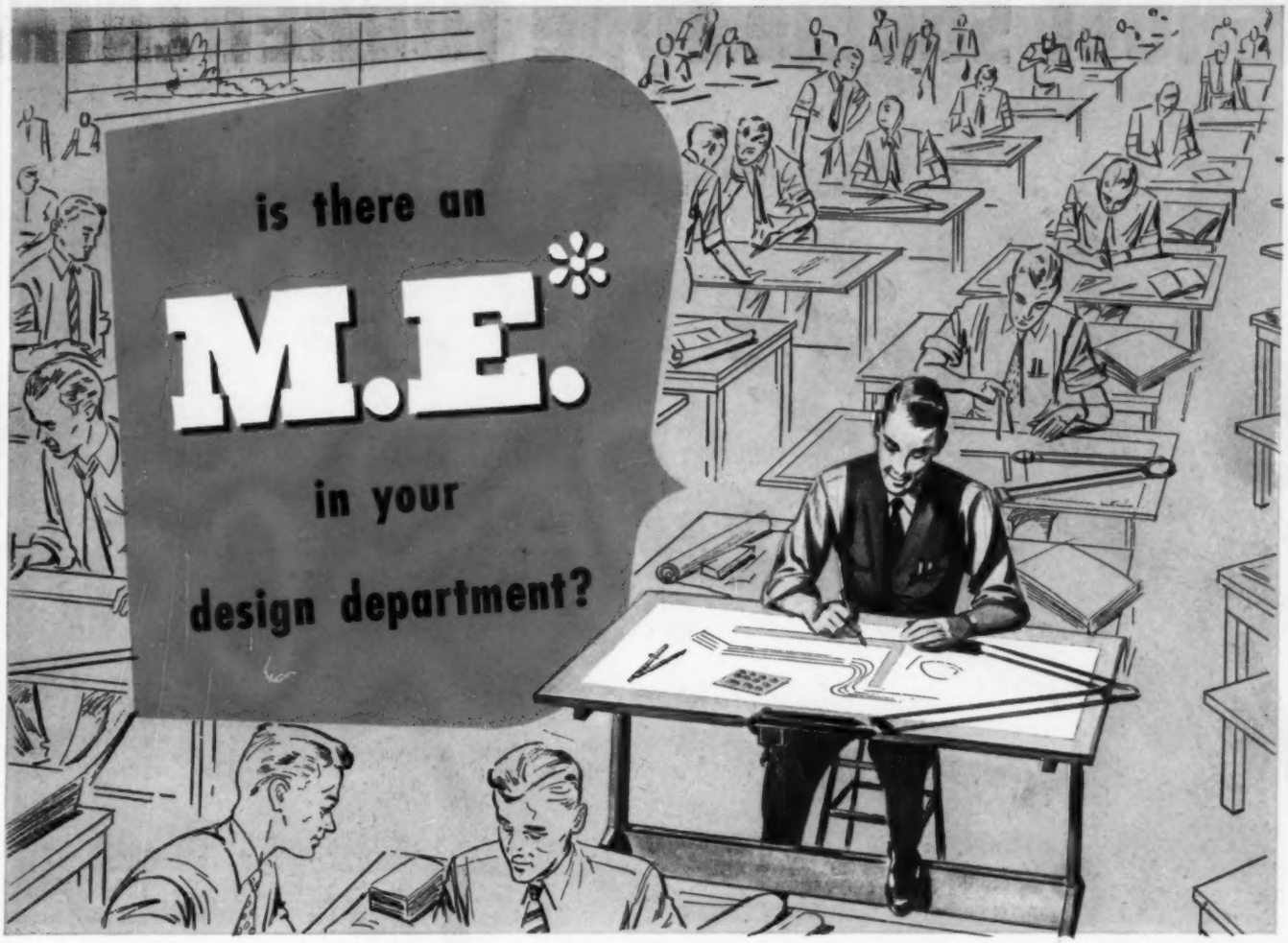
This safety stop is designed to stop the table quickly in case of control failure with a uniform decelerated motion without severe shock to parts of the Planer. All parts are completely enclosed to protect them from dirt and chips so there is no chance of failure.

This stop also is used as a jack for relocating the table over the bull wheel by inserting a handle in the stop and pumping the table back to its running position. No crane or other means, therefore, is required for this operation which invariably results in damage to the gear teeth.

After the stop is used it automatically resets itself. The operator or maintenance department does not have to replace any parts or reset any mechanism, thereby saving time and eliminating the human element.

HYPRO PLANER
Positive Hydraulic TABLE STOP

THE CINCINNATI HYPRO PLANER COMPANY
PLANERS · BORING MILLS · PLANER TYPE MILLERS
CINCINNATI, OHIO



You may have an M.E. and not know it! Seek him out! Encourage him to let himself go! Here is what you may gain:

(1) The greatest jump on competition you've ever scored, with a product that's *modern*—*pounds* lighter at no extra cost. Or, (2) new savings in production, with castings that require only one machine cut from as-cast to finish! Or, (3) in the case of a heavy product, castings that can be *handed* through production instead of *trucked* or *hoisted*. And with all of these advantages, a dependable source for high-quality castings that will be delivered with no delays, in whatever quantity you need them for *full* production.

These are all tangible, proved benefits that other manufacturers have gained when their M.E.'s got a hearing. If you haven't an M.E. on your staff, we'll send one of ours. ALUMINUM COMPANY OF AMERICA, sales agent for American Magnesium products, 1709 Gulf Building, Pittsburgh19, Pa. Sales offices in principal cities.

***M.E., in this case, means Magnesium Enthusiast, and Mechanical Engineer, as well. He's probably young, may have joined you after the war. He knows from experience the powerful appeal of American Magnesium Castings: 75% lighter than iron, 35% lighter than aluminum, machinable at high speed to a superlative finish. He knows the economics of magnesium, which makes his recommendations practical.**

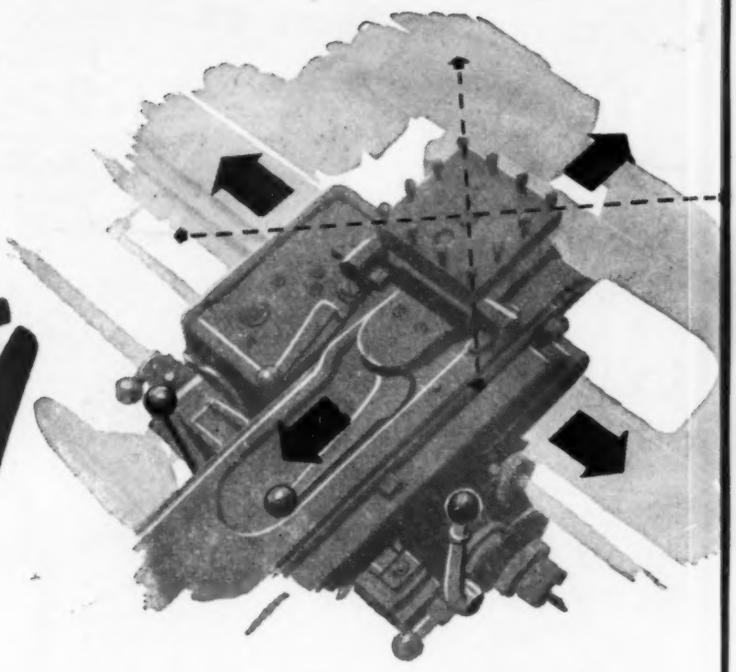
MAGNESIUM MAZLO Reg. U.S. Pat. Off. PRODUCTS

AMERICAN MAGNESIUM CORPORATION

SUBSIDIARY OF ALUMINUM COMPANY OF AMERICA

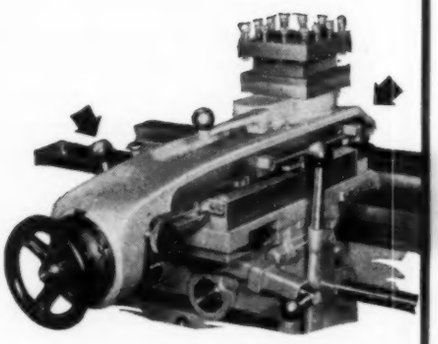
GISHOLT Saddle Type TURRET LATH

Exclusive Versatility

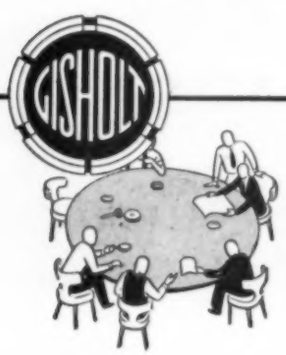


Power Rapid Traverses for side carriage and cross slide are controlled by dual levers, thus permitting them to move independently or together.

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin



Gisholt's more versatile power rapid traverse reduces time lag between cuts, speeds production, saves time and money. *This has been a standard Gisholt feature for over twenty years.*



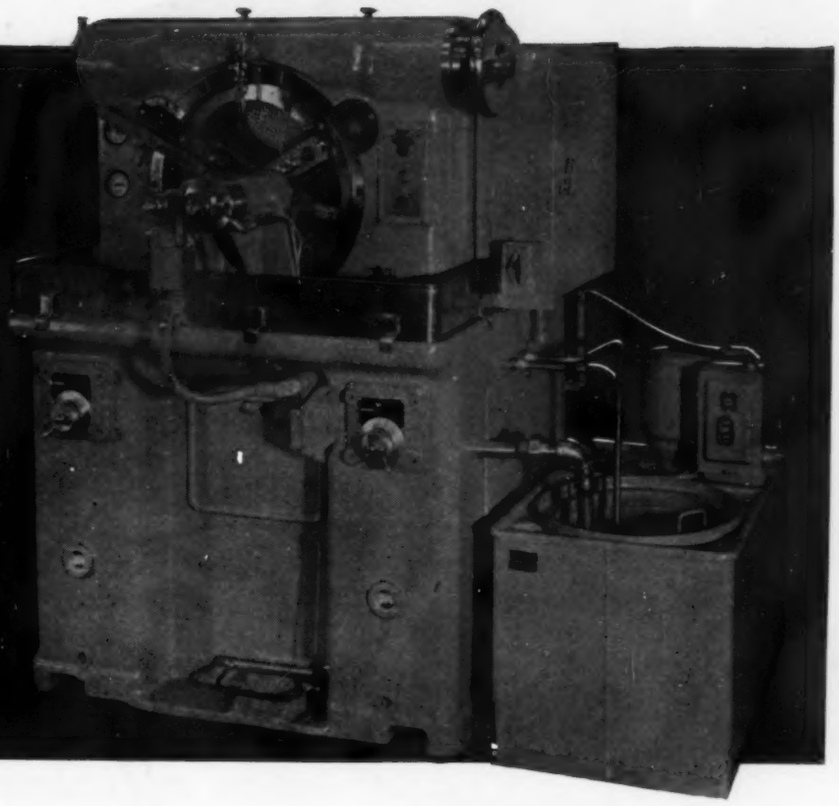
THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS BALANCERS • SPECIAL MACHINES

WANT CLOSE-FIT THREADS...*FAST?*

hen you want

THE NAMCO TRIPLE ROLL HYDRAULIC THREAD and FORM ROLLING MACHINE with Magazine Feed and Hydraulic Loader



This new precision high-production machine is the perfect answer for shops that have a large volume of long and short thread work requiring up to class 4 fit and unsurpassed finish.

Operating on the feed-through principle, with interchangeable two-roll or three-roll heads, the Namco Thread-Roller regularly produces smoother, more accurate work than ground threads. Capacities range from $\frac{3}{8}''$ up to $1\frac{1}{2}''$ using three rolls—and $\frac{1}{8}''$ to $\frac{9}{16}''$ using two rolls. Because of three-roll operation and three-point support which eliminates distortion, the machine is a "natural" for hollow work.

With the addition of magazine feed and hydraulic loader, just announced, the Namco Thread Roller becomes the fastest, most versatile, *most accurate* means for threading and form rolling, solid or hollow work to close tolerances with fine finish. Send us samples of the jobs you do; we'll do the rest—in quoting you on your requirements.

Complete details on the Namco Thread Roller are contained in this new eight-page bulletin. Ask us for TR 47.

The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing

ARMSTRONG

ARMSTRONG TOOL HOLDERS

are more efficient

It takes years of development, improvement and practical experience to create and perfect a line of tools. This has been the specialized work of ARMSTRONG, a contribution to machining efficiency which they have carried on continuously for 59 years.

Starting with the Armstrong Principle of inserted cutters in permanent tool shanks that "Saves: all Forging, 70% Grinding and 90% High Speed Steel," they created this unique method of tooling which has changed shop practice in over 96% of the machine shops and tool rooms. And, today, in a specially built plant, equipped with every modern facility and staffed with experts in each phase of tool making, this work goes on.

To you, as a tool user, here is always one safe principle—specify ARMSTRONG TOOL HOLDERS for every operation on lathes, planers, slotters and shapers, for turret lathes and screw machines. They are cataloged and stocked by all leading supply houses.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

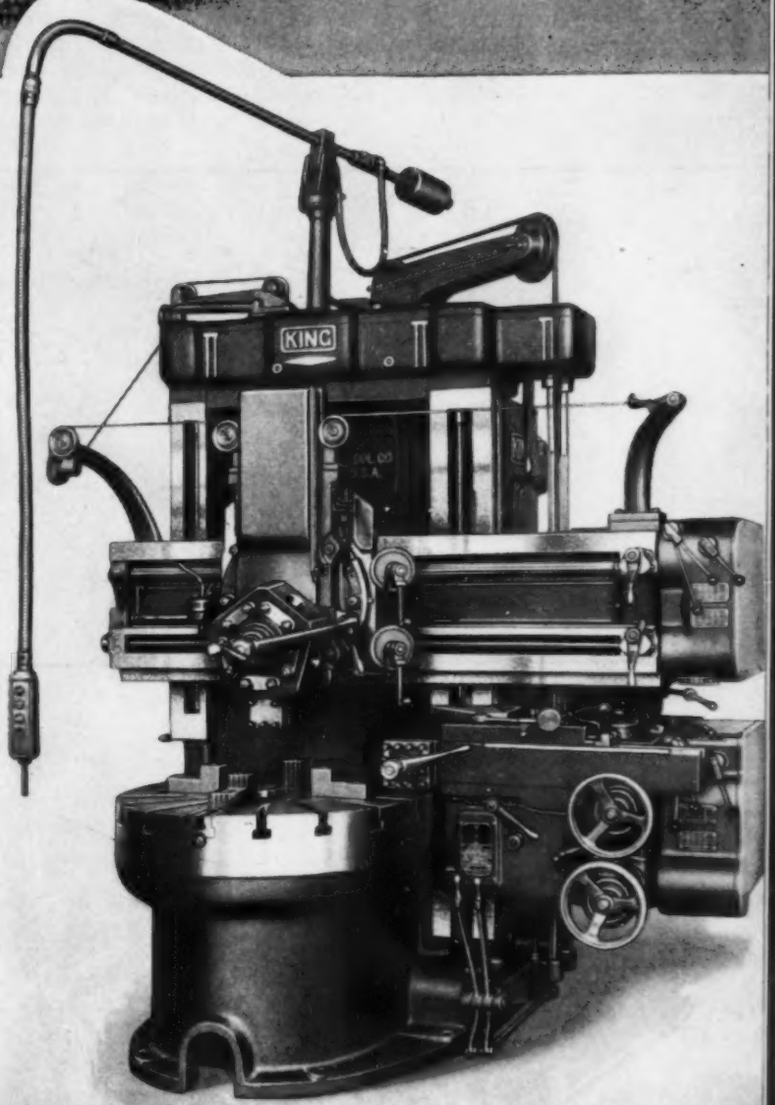
5215 W. ARMSTRONG AVE. CHICAGO 30, U.S.A.

Eastern Whse. & Sales Office: 199 Lafayette St., New York 12, N. Y.
Pacific Coast Whse. & Sales Office: 1275 Mission St., San Francisco 3, California

RIGIDITY is *"built in"* the

NEW SERIES

KING 42 inch Vertical Boring and Turning Machine



The New Series KING 42 inch Machine is of massive design, heavier, more rigid construction. It has more power—a wider range of feeds and speeds and is particularly suited to the successful use of carbide tools.

As a further aid in keeping costs down all operating controls are conveniently located at the front of the machine. A point of design which saves time and makes the job easier for the operator.

King offers the widest selection of general purpose Vertical Boring and Turning machines available today—ten sizes handling diameters up to 144 inches.

For consistently accurate production it will pay you to investigate the New Series KING Vertical Boring and Turning machines. Consult a King Engineer.

American Steel Foundries

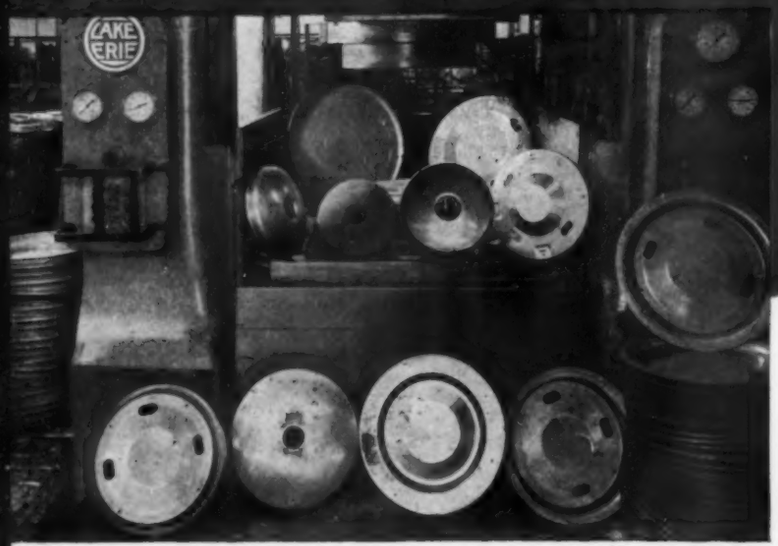
KING MACHINE TOOL DIV.
CINCINNATI 29, OHIO

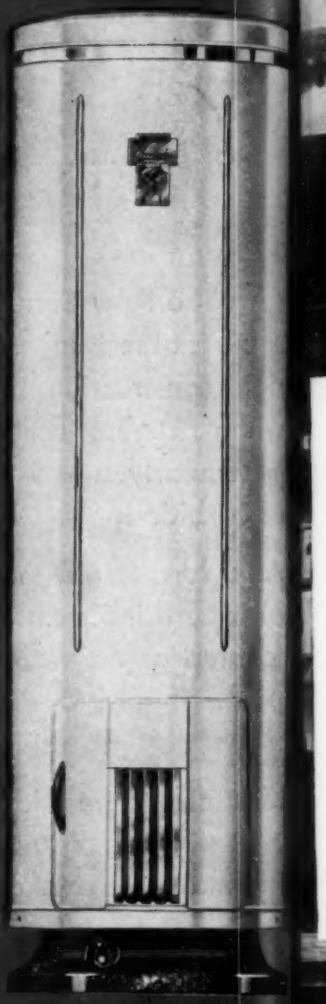
Builders of Vertical Boring and Turning Machines and Sebastian Lathes

A. O. SMITH
gets top quality HIGH OUTPUT
with LAKE ERIE Hydraulic Press

LAKE ERIE
ENGINEERING CORP.
BUFFALO, N.Y. U.S.A.

THE A. O. SMITH Corporation of Milwaukee, Wisconsin report that the Lake Erie Hydraulic Press in their Kankakee plant meets every expectation. In their own words, "It is an excellent press for heavy materials and it is easy to set up and operate. Rate of production and quality of parts are gratifying." Today, leaders in metal forming such as A. O. Smith Corporation are taking advantage of the efficiencies possible with these newer hydraulic presses. They are enjoying increased production, improved product quality and lower unit costs. Why not consult Lake Erie about the possibilities for hydraulic press applications in your production. No obligation whatsoever.





PERMAGLAS automatic water heater manufactured by A. O. Smith Corporation has glass-lined tank, Fiberglas Insulation and many other new features. Tank ends and covers are efficiently produced on Lake Erie Hydraulic Press.

TWO MEN OPERATE the press. One man feeds parts in and the other removes them. Water heater tank heads are produced at the rate of 237 per hour, base plates at the rate of 259 per hour.

ILLUSTRATION SHOWS various water heater tank pieces produced and operations performed. The press is a versatile unit, easy to set up and operate, and forms heavy material (¼" sheet steel) with ease and precision.

LAKE ERIE ENGINEERING CORP.

MANUFACTURERS OF
HYDRAULIC PRESSES AND SPECIAL MACHINERY

General Offices and Plant:
507 Woodward Avenue, Buffalo 17, New York

OFFICES IN PRINCIPAL CITIES AND FOREIGN COUNTRIES

LEADING MANUFACTURER OF HYDRAULIC PRESSES—ALL SIZES AND TYPES—METAL WORKING...PLASTICS MOLDING FORGING...METAL EXTRUSION....PROCESSING....RUBBER VULCANIZING...STEREOTYPING...SPECIAL PURPOSE

800-TON LAKE ERIE hydraulic downstroke housing type press producing water heater tank parts in the A. O. Smith Corporation plant in Kankakee, Illinois. This is one of many Lake Erie Hydraulic Presses operated by A. O. Smith. Press is a self-contained, single action model with a 125-ton cushion. Working space measures 50″ right to left and 48″ front to back. The main ram has a 60″ stroke and the cushion ram a 15″ stroke. The daylight opening is 60″.

Reaming
accurate, straight, round holes

With
BARBER-COLMAN
CARBIDE TIPPED
REAMERS

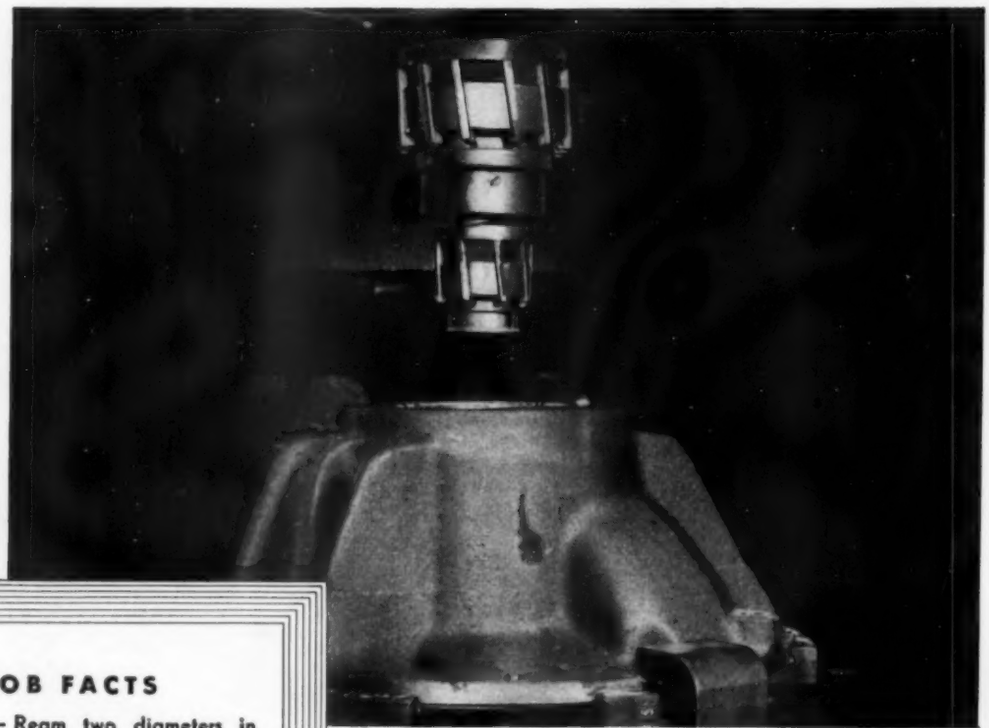
Sand pockets in these motor truck differential housings caused early dulling of high-speed steel reamers and unsatisfactory finish on the reamed surfaces. Barber-Colman Carbide-Tipped Inserted Blade Reamers were tried, and tool life jumped from *150* to *3000* pieces per sharpening.

These reamers are designed with irregular blade spacing, and special *cutting* and *relief* clearances to provide smooth cutting action. Two holes are reamed straight and round, in alignment. Diameters are held within .001". The ability of the carbide to resist wear in this abrasive material greatly improves the finish, and the irregularly spaced blade design has eliminated the tendency of the reamer to *pattern* and form *welts*.

Consult Barber-Colman Reamer Engineers for application of Carbide-Tipped tools to your reaming problems.

Barber-Colman Company

GENERAL OFFICES AND PLANT 101 LOOMIS ST., ROCKFORD, ILLINOIS, U.S.A.



JOB FACTS

Operation — Ream two diameters in alignment

Material — Malleable Iron Casting

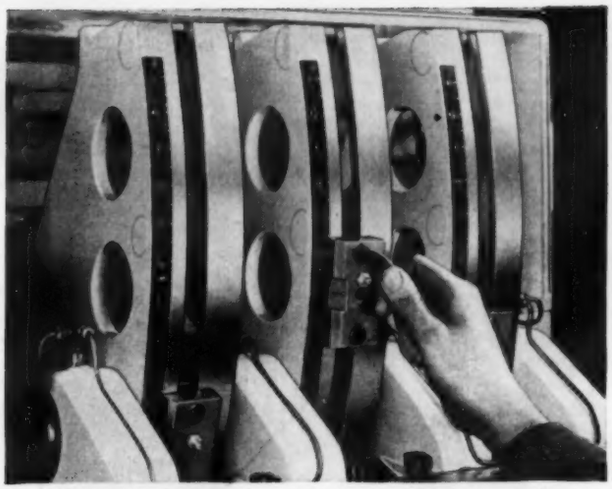
Tool Life — 3000-4000 castings per sharpening

Tolerance — Diameters finished within .001"

BARBER COLMAN

MODERN MACHINES DEMAND *Modern* CUTTING TOOLS

No cam worries with a Warner & Swasey 5-Spindle Automatic



Patented "Quick Set" quadrants cut set-up time, quickly adjust to any feed stroke between 0 and 5 inches.

NO CAMS TO DESIGN

NO CAMS TO MACHINE

NO CAMS TO STORE

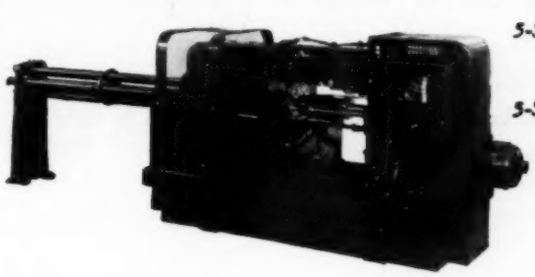
NO CAMS TO FIND

NO CAMS TO CHANGE

JUST make a simple setting and there you have your new feed stroke, clearly indicated on a graduated scale. Yes, it's as easy as that! All feed strokes are quickly available for both longitudinal and cross slides. No more need to sacrifice cycle time because the "right" cam is not on hand or because a cam change would take too long. You always get your exact feed stroke quickly on the Warner & Swasey 5-Spindle Automatic.

Full information on these new machine tools will show you how their many new features and design improvements can cut costs, boost production in your shop. Ask your nearest Warner & Swasey office for full particulars or write to Warner & Swasey, Cleveland 3, Ohio.

IT'S SIMPLE TO SET UP



5-Spindle Bar Machines
—1¼" Standard Capacity
—2¼" Oversize Capacity
5-Spindle Chucking Machine—6" Swing

You Can Machine it Better, Faster, for Less.. with a Warner & Swasey

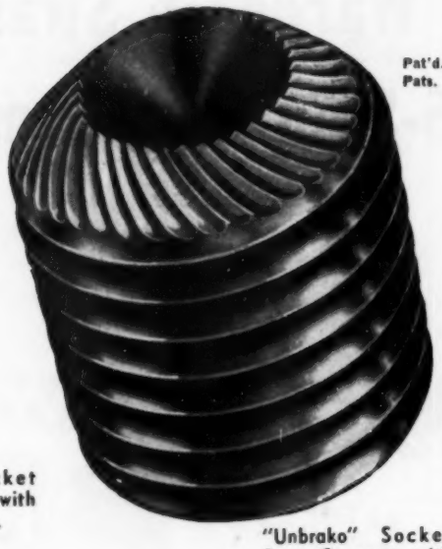
WARNER & SWASEY
Machine Tools
Cleveland

TURRET LATHES, MULTIPLE & SINGLE SPINDLE AUTOMATICS, PRECISION TAPPING AND THREADING MACHINES

Won't SHAKE LOOSE

"Unbrako" Socket Head Stripper Bolt with *Knurled* Threads and Head.

"Unbrako" Socket Set Screw with *Knurled* Threads.



"Unbrako" Socket Set Screw with *Knurled* Cup Point.

UNBRAKO SOCKET SCREW PRODUCTS

Reg. U. S. Pat. Off.

They *LOCK* because they're *KNURLED*

The "Unbrako" Socket Screw Products, shown above, are real "Fasteners" . . . they positively will not *shake loose!* A loose "Fastener" *invariably* causes shut-downs, loss of production, and just as *invariably* increased costs . . . *each* of which these "Unbrako" Screws absolutely prevent. The "Unbrako" *Knurled* threads and knurled cup points positively *hold tight,* regardless of the most chattering vibration . . . making them excellent Self-Lockers. Knurling of the heads of "Unbrako" Socket Screw Products also allows for slip-proof and fumble-proof grip, even if fingers and heads are oily. *Incidentally*—the "Unbrako" Self-Lockers with Knurled Cup Points can be used *again* and *again.*

Knurling of Socket Screws originated with "Unbrako" in 1934.

Millions of these "Unbrako" Socket Screw Products—in sizes from #4 to 1½" diameter, and in a full range of lengths—are being used throughout industry . . . to save assembly time, facilitate compact designs, reduce weight and shut-down costs. We are prepared to furnish "Unbrako" Products in Brass, Stainless Steel, Monel, Bronze or whatever *your* requirements may be. Ask for *your* copy of the "Unbrako" Catalog.

Write us for the name and address of your nearest "Unbrako" Industrial Distributor.

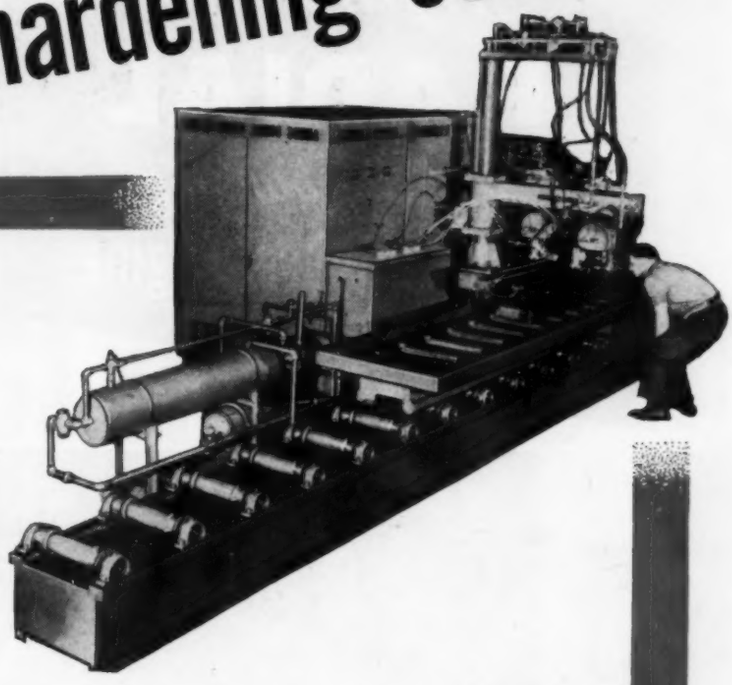
OVER 45 YEARS IN BUSINESS

STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNA., BOX 4 • BRANCHES: BOSTON • CHICAGO • DETROIT • INDIANAPOLIS • ST. LOUIS • SAN FRANCISCO

ELECTRONIC HEATERS ON THE JOB: LATHE-BED HARDENING

uniform hardness tougher lathe ways reduced hardening cost



A LONGER LEASE ON LIFE is now being given to machine-tool lathes at the Hendey Machine Company, Torrington, Conn. Thanks to the uniform hardness made possible by a G-E electronic induction heater, precision surfaces of lathe-bed ways remain "mirror-smooth" far beyond previous life expectancy . . . are less vulnerable to precision-destroying wear and accidental damage.

At this company, lathe beds are mounted on a movable carriage, and their way surfaces are progressed under the specially mounted inductor coil of a G-E 50-kw electronic heater for uniform, controlled heating and automatic quenching.

Using the G-E electronic heater, these lathe-bed wearing surfaces are heat-treated with results unmatched by former methods. Surface hardening is accomplished with close depth control, at a faster rate, and with assured uniformity.

Net result: a better product through induction heating.

Electronic INDUCTION HEATERS

YOUR PRODUCT AND INDUCTION HEATING

Whether your product involves brazing, soldering, hardening, or annealing, be sure to get in touch with the Heating Specialist in the nearest G-E Office. His suggestions are very likely to result in higher production, lower cost, and better products, as they have for many other manufacturers. In the meantime, send for free bulletin GES-3290, "The How and What of Electronic Induction Heating." ***Sect. 675-178, Apparatus Department, General Electric Company, Schenectady 5, N. Y.***

GENERAL ELECTRIC

675-178

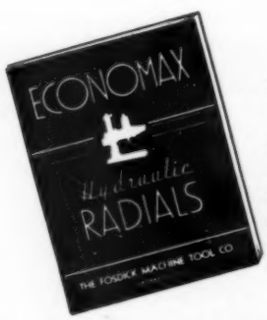
FOSDICK
Hydraulic
RADIAL
Used in building
Maritime Diesel Engines

● The accompanying illustration shows an interesting application of a Fosdick Hydraulic Radial in the General Engineering & Dry Dock Co. plant in San Francisco.

This view shows the Fosdick Radial drilling a series of holes in the flange of a steam turbine part.

Here again the versatility and time saving qualities of this hydraulically controlled machine are recognized. For example; interlocking clamping of head and clamping of column with engaging of feed mechanism by means of hydraulic device operating from spindle feed clutch lever is a big help in reducing set up time.

Also locating all control levers on the head enables operator to have absolute, instantaneous control of all machine functions from his normal working position. And hydraulic operation eliminates manual effort and accomplishes same results faster.



To fully appreciate the many advantages offered in Fosdick Hydraulic Radials, write for full descriptive bulletin Fosdick Radial Drill-RA. No Obligation.

Photo courtesy of GENERAL ENGINEERING and DRY DOCK CORPORATION, San Francisco plant.

FOSDICK MACHINE TOOL *Company*
CINCINNATI 23, OHIO

ALLIS-CHALMERS ANNOUNCES:

"Certified" Motor Service!

Independent Local Shops of High Standing Are Now Being Selected to Service and Repair Allis-Chalmers Motors—Transformers—Controls—Pumps—on a Certified Basis!

THE NAME "ALLIS-CHALMERS" has always meant good motors, generously built for long life! Now you have an *added* reason for investing in Allis-Chalmers motors . . .

BETTER SERVICE

Throughout the U. S. qualified motor repair shops are being selected and authorized as Allis-Chalmers *"Certified"* Service Shops. Each will have trained personnel as well as complete facilities for servicing and repairing Allis-Chalmers motors to original factory-established standards!

"CERTIFIED" Service Benefits You These Ways:

YOU GET FINEST PARTS. *"Certified"* Service Shops use genuine Allis-Chalmers repair parts — or parts of equal quality! Each shop is given complete service information, including factory procedure and drawings, if necessary. Result: factory-like workmanship!

YOU GET FINEST SERVICE. Every Allis-Chalmers *"Certified"* Service Shop has been selected on the basis of its excellent reputation in the community. It's the kind of shop you *like* to do business with!

How To Get Allis-Chalmers "CERTIFIED" Service:

Right now most Allis-Chalmers *"Certified"* Service Shops are located in the larger U.S. industrial areas. But they're rapidly expanding. For service, call your nearby A-C District Office, or Authorized Dealer. If we do not have a Service Shop in your locality, we will recommend the one closest to you. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN. A 2457

"Headquarters" for Motors ½ to 25,000 hp and Over!

Do You Need Standard, squirrel-cage motors from 1 to 200 hp? Your nearby "A-C" authorized dealer or district office may be able to help you — immediately from stock.

For big motors, 250 to 25,000 hp and up, call your "A-C" field engineer. He's an expert on motor application —can help you solve drive problems involving large or small motors.

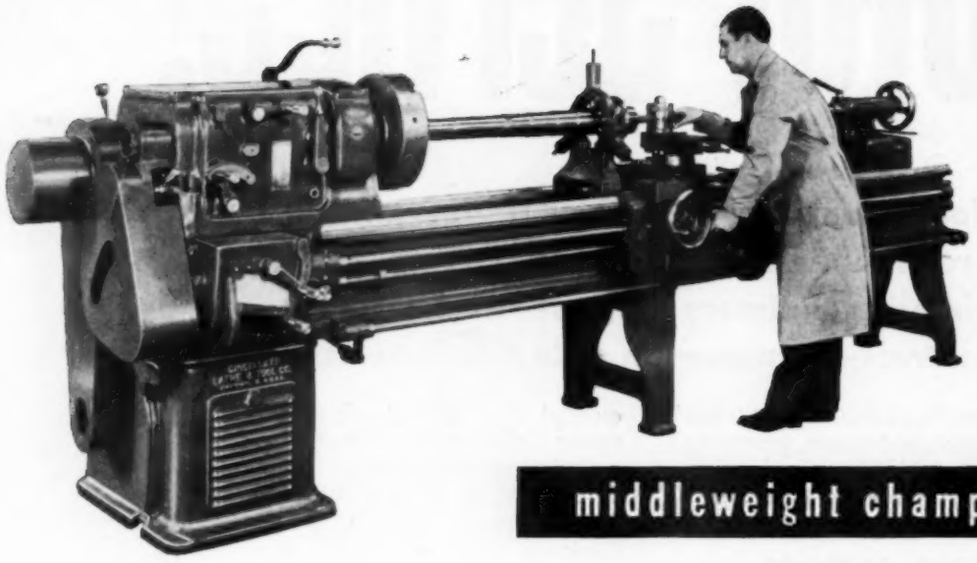
The big question today is "How Fast Can You Deliver?" Allis-Chalmers representatives in over 60 District Offices—over 200 Authorized Dealers — have *up-to-the-minute* delivery schedules available to them. Call either of these sources next time you need *good* motors.

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment—Biggest of All in Range of Industrial Products

The new Traytop line of light duty geared head engine lathes (10", 12½", 15", and 18" swing sizes) offers many "high price" lathe features at truly low cost: 12 spindle speeds, selected by color-coded dial; 48 thread and feed changes; exceptionally large spindles, anti-friction bearings, double-walled apron; totally enclosed gear box; many others. Distance between centers from 18" to 60". 15" and 18" sizes can be furnished with gap and gap block. Write for Bulletin T-100.

lightweight champ



middleweight champ

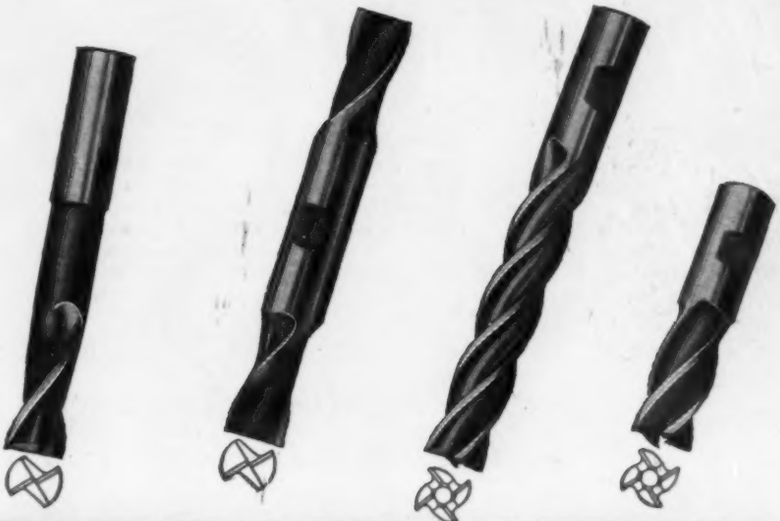
In the medium duty class, the Standard line (14", 16", 18", 20", 22", and 24" nominal swings) assures you real all-around utility with exceptionally low initial investment, quickly pays for itself by efficient handling of practically all your turning, boring, and threading operations. 12 spindle speeds, 32 thread and feed changes; distance between centers from 32" to 238". All sizes available with gap and gap block. Write for Bulletin S-100.

cintilathe

OF OUTSTANDING VALUE

CINCINNATI LATHE & TOOL CO., CINCINNATI 9, OHIO

If you use fast-spiral end mills, you'll want to try "Hi-Helix"



"Hi-Helix" End Mill at work in General Electric's Plastics Division, milling mold for radio cabinets.

If your plant has discovered the many advantages of using fast-spiral end mills to cut intricate slots, pockets and keyways, you'll get *even better results* when you switch to "Hi-Helix" End Mills, Pratt & Whitney's improvement on the ordinary fast-spiral cutter.

Drawing on its long experience in the design and manufacture of precision tools, Pratt & Whitney has endowed "Hi-Helix" End Mills with special properties that make them cut cleaner, *longer*. Because such tools work continuously at the highest feeds and speeds, "Hi-Helix" End Mills are made only of high quality high-speed steel, hardened for maximum performance under any conditions. *And an exclusive P&W surface-treatment keeps "Hi-Helix" spirals from loading up or galling . . . keeps cutting edges always clear of chips . . . increases wear-resistance.*

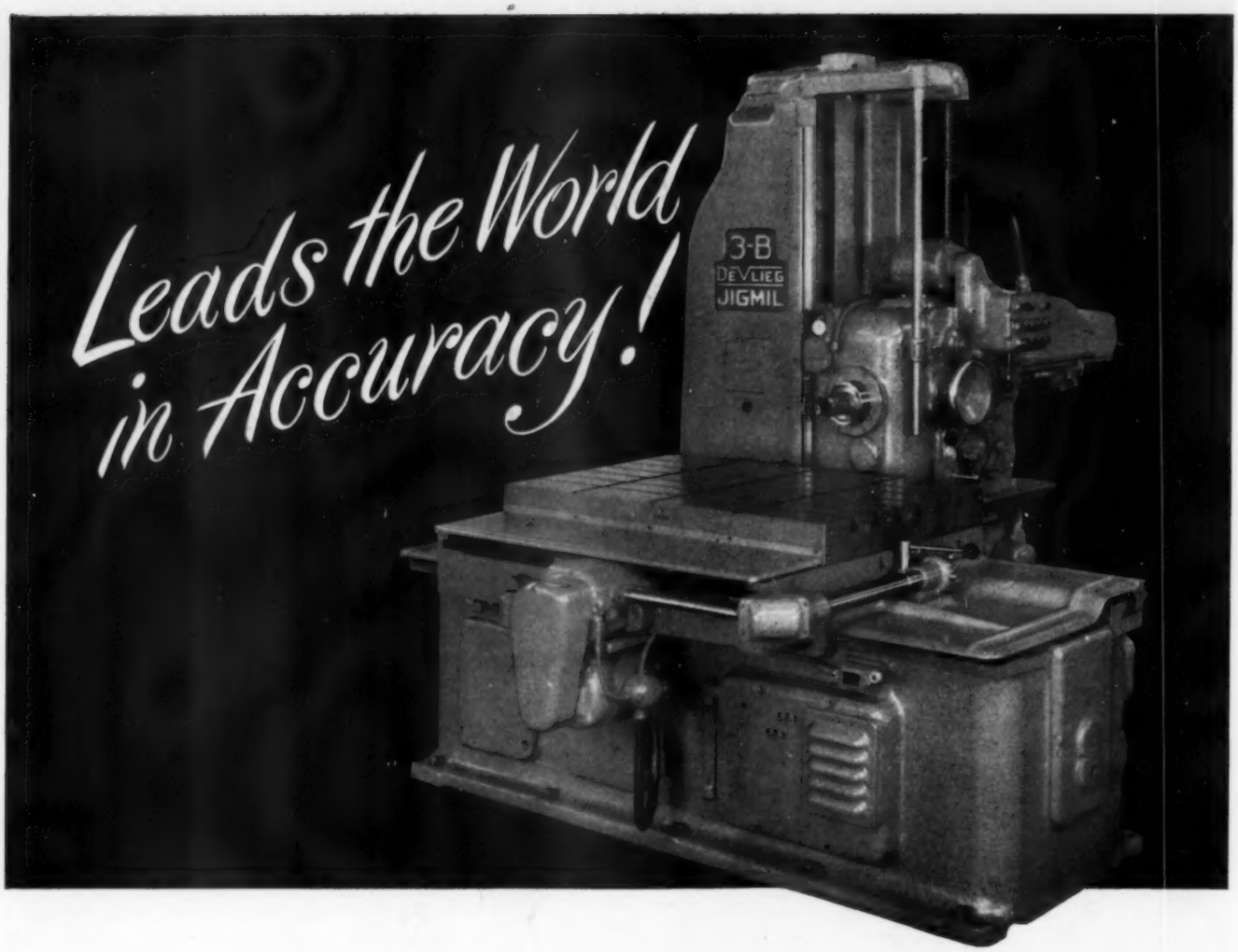
Available in single-end or double-end styles, in both regular and two-lipped types, and in a complete range of sizes, "Hi-Helix" End Mills reduce over-all costs on the most intricate milling . . . deliver finishes so fine that hand-work is drastically minimized. It will pay you to investigate. For free descriptive booklet, write

PRATT & WHITNEY
Division Niles-Bement-Pond Co.
WEST HARTFORD 1, CONNECTICUT

PRATT & WHITNEY

Hi-Helix
End Mills

"There is no better-paying investment than the right tools for the job"



The DeVlieg JIGMIL is now recognized as The World's Leader in the field of accurate boring, in addition to its unique capacity for high productivity on:

1. **Single part precision boring.**
2. **Tool, jig and die work.**
3. **Repetitive production work without jigs.**

Write today for new descriptive booklet.

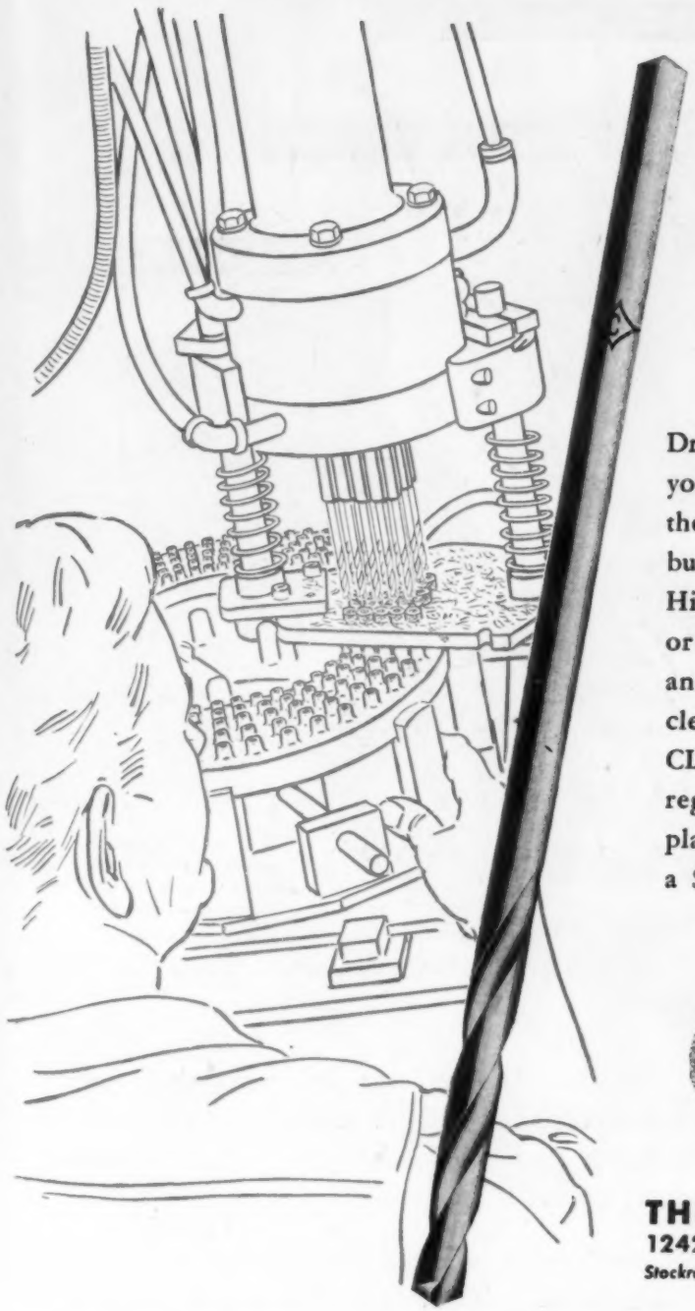
DEVLIEG JIGMIL

DeVLIEG MACHINE COMPANY

450 FAIR AVE., FERNDALE 20, (DETROIT) MICH.

CLE-FORGE HIGH SPEED DRILLS PRODUCE

1,469 MORE HOLES PER GRIND



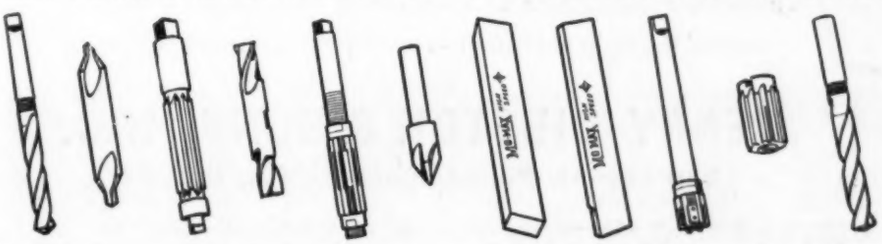
Typical Results of an Actual Test on *Stock Drills*

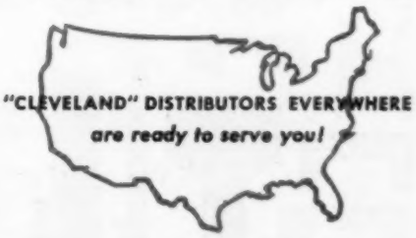
Drilling cast iron burners can be a problem—unless you use CLE-FORGE High Speed Drills. On the production job shown here, four makes of stove burner drills were carefully tested. CLE-FORGE High Speed Drills gave 3,466 holes per grind, or 1,469 more than the next best! This is not an unusual record. It is typical of many tests, and clearly demonstrates the superior performance of CLE-FORGE High Speed Drills. For information regarding a survey of drilling operations in your plant, write or call our nearest Stockroom to send a Service Representative, or . . .

Telephone Your Industrial Supply Distributor.

THE CLEVELAND TWIST DRILL CO.
1242 East 49th Street **Cleveland 14, Ohio**
Stockrooms: New York 7 • Detroit 2 • Chicago 6 • Dallas 1 • San Francisco 5
Los Angeles 11 • London W. 3, England

ASK YOUR INDUSTRIAL SUPPLY DISTRIBUTOR FOR THESE AND OTHER CLEVELAND TOOLS





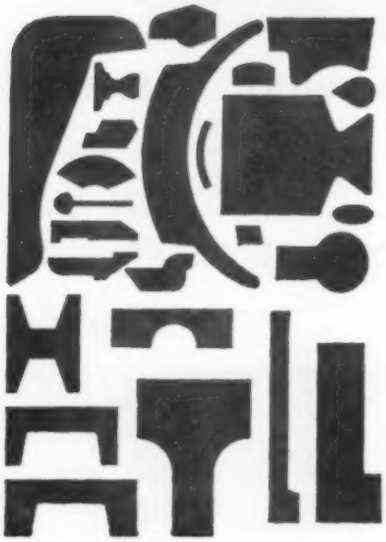
HOW MUCH *high priced tool steel* do you WASTE?

DISSTON
HOT ROLLED SHAPES

SAVE METAL • SAVE WORK
SAVE TIME • SAVE MONEY

Knife of steel alloy containing 18% Tungsten, 4% Chrome and 1% Vanadium. Made from shape shown in center illustration.

DISSTON HOT ROLLED SPECIAL SHAPES ARE SUPPLIED IN MANY FORMS



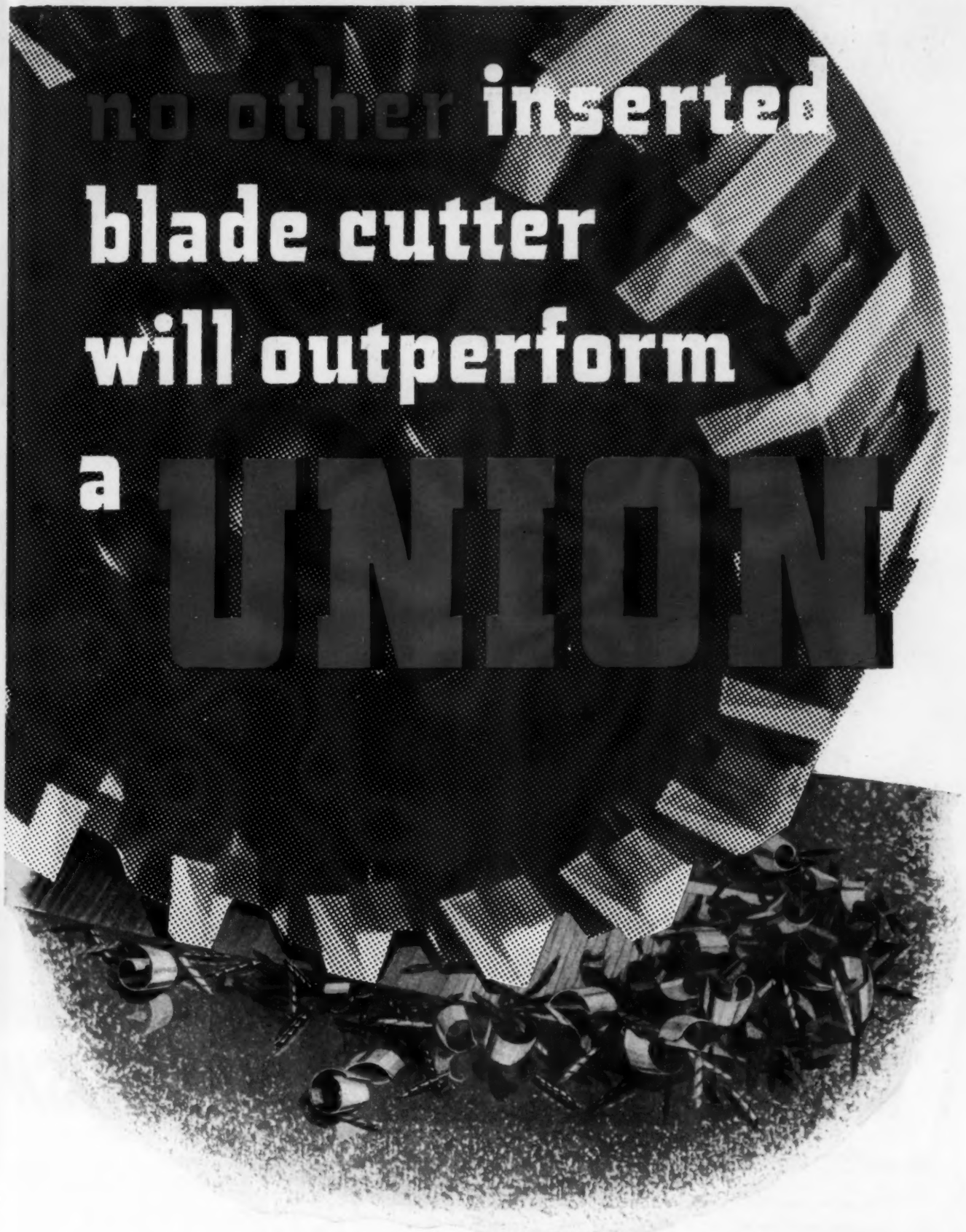
Disston hot rolled special shapes are supplied in both alloy and carbon tool steels, and in electric and open hearth grades. All shapes are rolled to close tolerances and the finish is exceptionally fine.

Send us dimensional sketches of the shapes you require, together with the analysis and approximate quantities desired. Full particulars will be sent to you promptly.

Disston metallurgists and engineers will be glad to help you find the right solution to any of your tool steel problems.

HENRY DISSTON & SONS, INC.
620 Tacony, Philadelphia 35, Pa., U. S. A.

STEEL: Everybody who wants to obtain steel can help himself to get it by immediately starting scrap into the channels that serve steel mills.

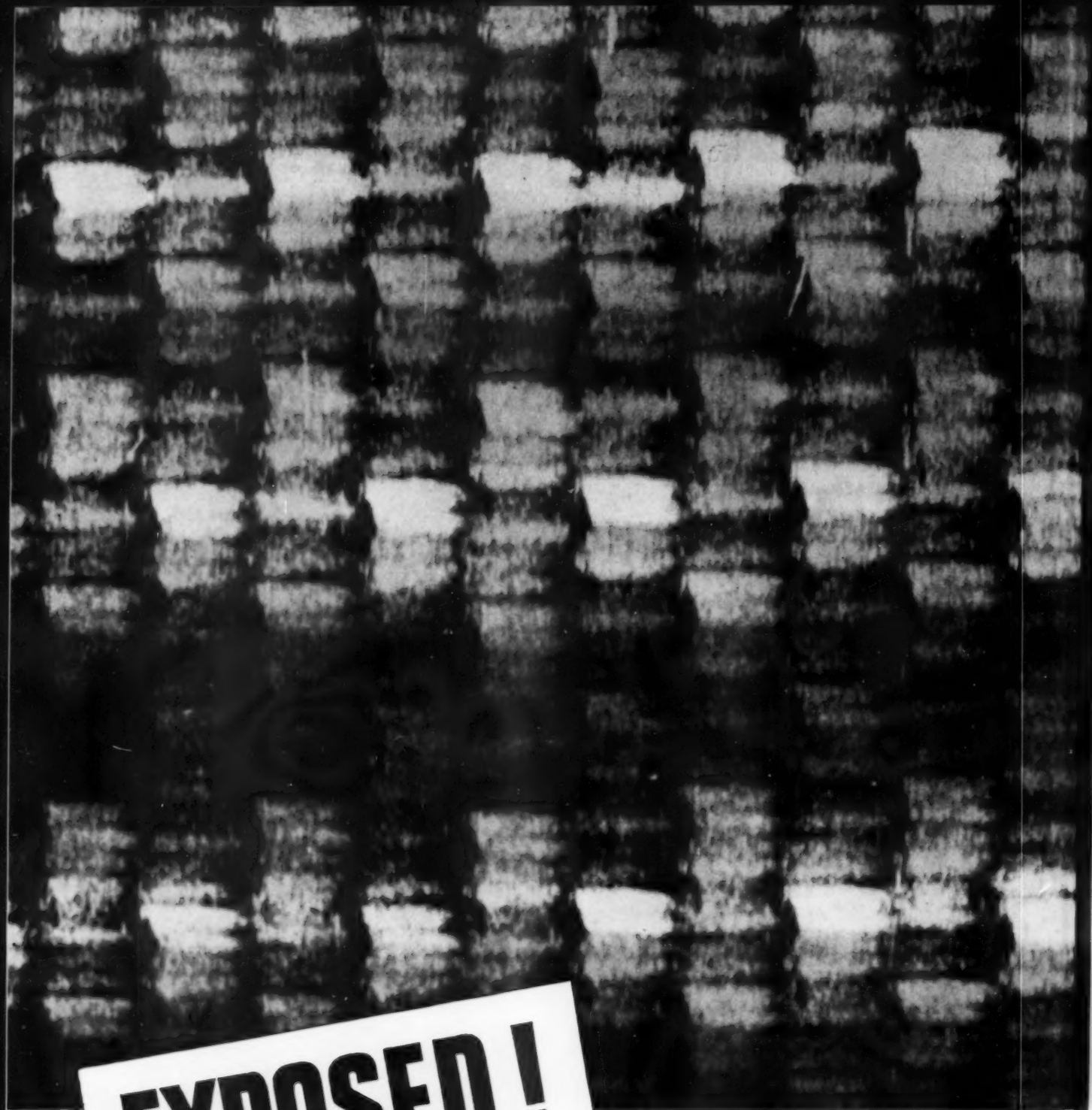


contact your local distributor

UNION TWIST DRILL COMPANY, ATHOL, MASSACHUSETTS

MILLING CUTTERS • GEAR CUTTERS • TWIST DRILLS • HOBS • REAMERS • CARBIDE TOOLS

We own and operate S. W. CARD MANUFACTURING CO., Division, Mansfield, Mass.
BUTTERFIELD Divisions, Derby Line, Vt., Rock Island, Quebec. Manufacturers of Taps, Dies, Screw Plates.



EXPOSED!

by SUPERFINISH

Here, in an enlargement of a 3/4" section, you see the grinding defects —*chatter and feed marks*—left on a ground surface which was previously considered acceptable. Partial Superfinishing shows them up. Complete Superfinishing will remove them . . . and produce a bearing surface which will last infinitely longer.

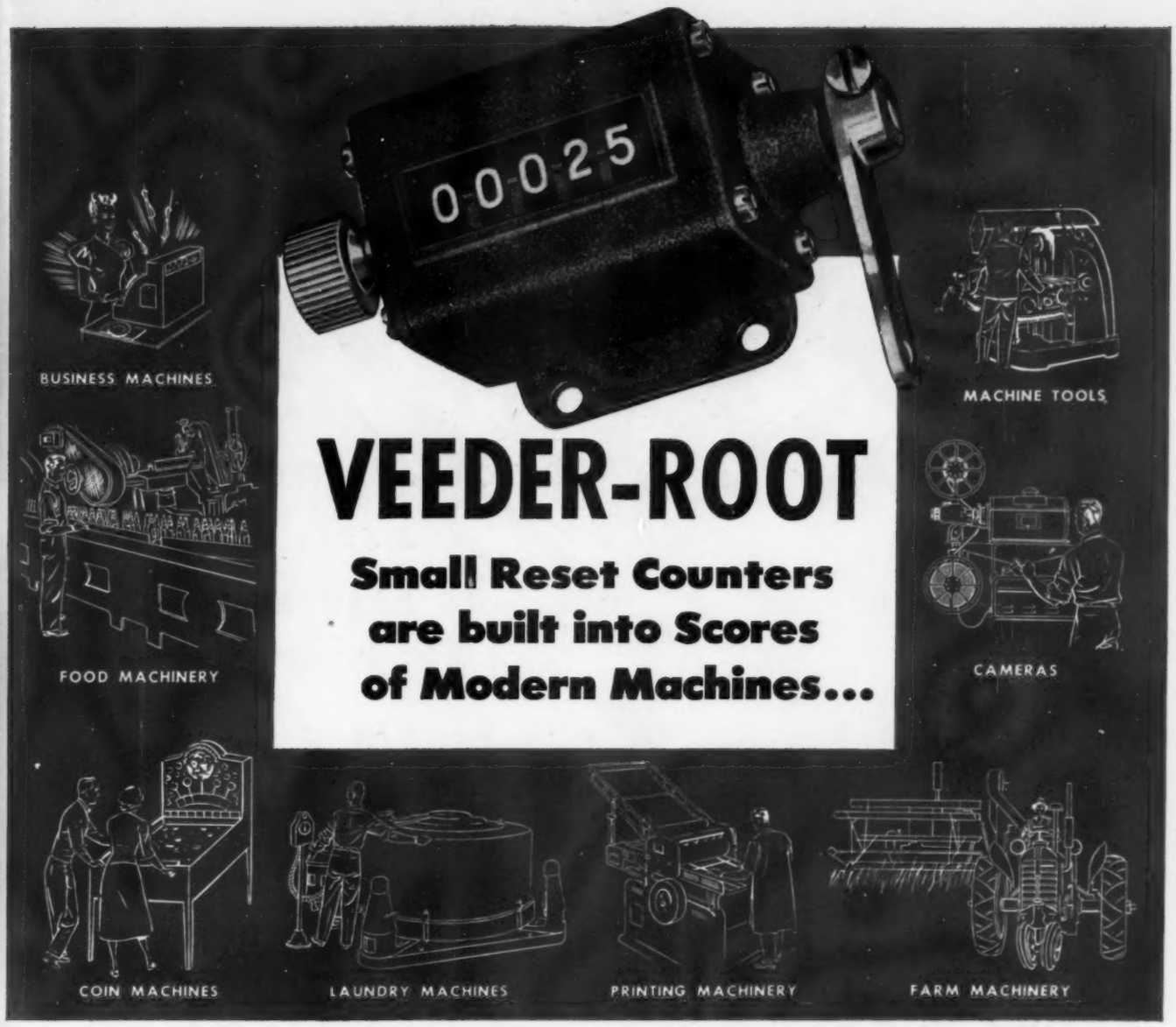
Superfinishing is a quick and inexpensive process which more than pays for itself in better performance, longer life and reduced service problems. The booklet, "Wear and Surface Finish," will be sent upon request. Please use your company letterhead.

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

THE GISHOLT ROUND TABLE represents the collective experience of specialists in machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

TURRET LATHES • AUTOMATIC LATHES • BALANCERS • SUPERFINISHERS • SPECIAL MACHINES



VEEDER-ROOT

Small Reset Counters are built into Scores of Modern Machines...

to add EXTRA UTILITY and Marketability

Small size, compact, these Small Reset Counters (Series 1120) can be readily built into an almost endless catalog of machines and products.

Available in 5 Types: Revolution, Ratchet, Ratchet with Lever Reset, Ratchet with Lock-and-Key Reset, and as a Combined Counter (either Revolution or Ratchet) made with 2 counters in 1 case, adding in unison — one reset counter, and one non-reset totalizer.

Other Specifications: 5 figures standard. Speed, 1000 counts per minute. Drive shaft on left or right side, rotating top coming or top going.

A counter of almost infinite uses... gives any product, into which it is built, the added usefulness of keeping its own production or performance records, in terms of turns, strokes, etc.

Write for complete specifications and prices, and for 8-page Catalog of *all* Veeder-Root Counters for mechanical, electrical and manual operation.

Veeder-Root
INCORPORATED
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Counting Devices

BUILD THEM INTO YOUR NEW MACHINES
... TO BUILD UP SALES

In Canada: Veeder-Root of Canada, Ltd., 915 St. James St., Montreal 3. In England: Veeder-Root Ltd., Dickinson Works, 80 Purley Way, Croydon, Surrey.

"600" has been successfully used for many years as the solution to many extremely difficult bearing problems. It is a true bearing metal and—an entirely different one. "600" can be drawn or forged and readily fabricated in a great variety of sizes and shapes.

Many thousands of auto and truck transmissions have their reverse idler gears running on shafts of "600". A large quantity of it has been very successfully used for pump rods and other purposes where lubrication may be neglected. "600" IS IDEAL FOR PROPELLER SHAFTS IN POWER BOATS AND HUNDREDS OF OTHER USES, SUCH AS SPINDLES, SEAL RINGS, BEARING RINGS, WORM GEARS, CONNECTING RODS, CAMS, THRUST WASHERS, SUPERCHARGER SHAFTS, ELECTRICAL, AIRCRAFT AND AUTOMOTIVE EQUIPMENT, CONTROL APPARATUS AND MARINE HARDWARE.

"600" SERIES

BEARING METAL *FOR TOUGH JOBS*

- High strength
- Resistance to wear
- Corrosion resistant

LIGHTER WEIGHT

Higher speeds and lighter weights are being demanded by leading designers of the most modern equipment. "600" Metal is specified for bearings because of its adaptability to meet the most exacting requirements. "600" Metal is approximately 8% lighter in weight than phosphor bronze alloys.

If you have a bearing problem, write us. We will supply you with samples of material for testing your own application. A complete booklet on "600" Series Alloys is yours for the asking.

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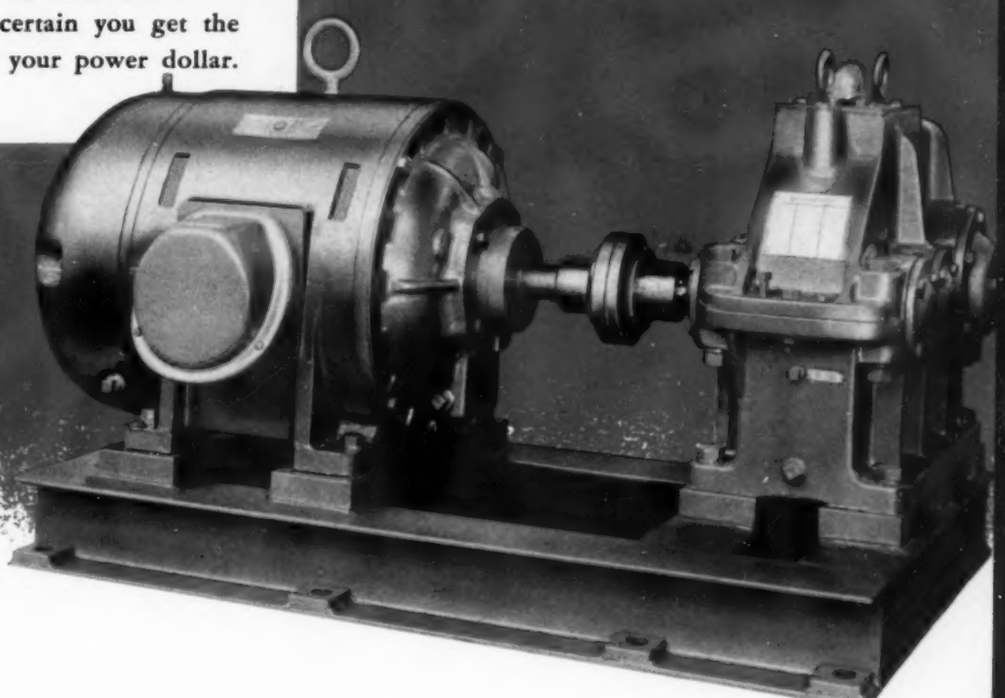
USE THIS ONE SOURCE

FOR YOUR RPM REQUIREMENTS

Westinghouse offers the way to simplify your geared drive problems . . . to prevent headaches, save money, assure *more productive power.* Let Westinghouse geared-drive engineers take the responsibility for application, installation and performance . . . make certain you get the most in applied power for your power dollar.



FOR DRIVES UP TO 1,000 HP . . . USE WESTINGHOUSE SPEED REDUCERS—

For drives from 75 to 1,000 hp, speed reducers have no equal . . . and, in some instances, they're the best answer for drives below 75 hp, particularly when the prime mover is Diesel, gasoline or steam powered . . . or when existing installations dictate a separate speed-reduction unit. Westinghouse Speed Reducers are compact, fit closely to the machines they serve, have power efficiencies averaging 96% to 98%.

Continuous, trouble-free operation is assured by simplified design, exclusive Westinghouse BPT heat-treating of gears and pinions, positive lubrication and accurate construction.

A range of 28 standard ratios . . . from 2.82 to 70.5 . . . makes proper selection easy, and simplifies ordering and installation.

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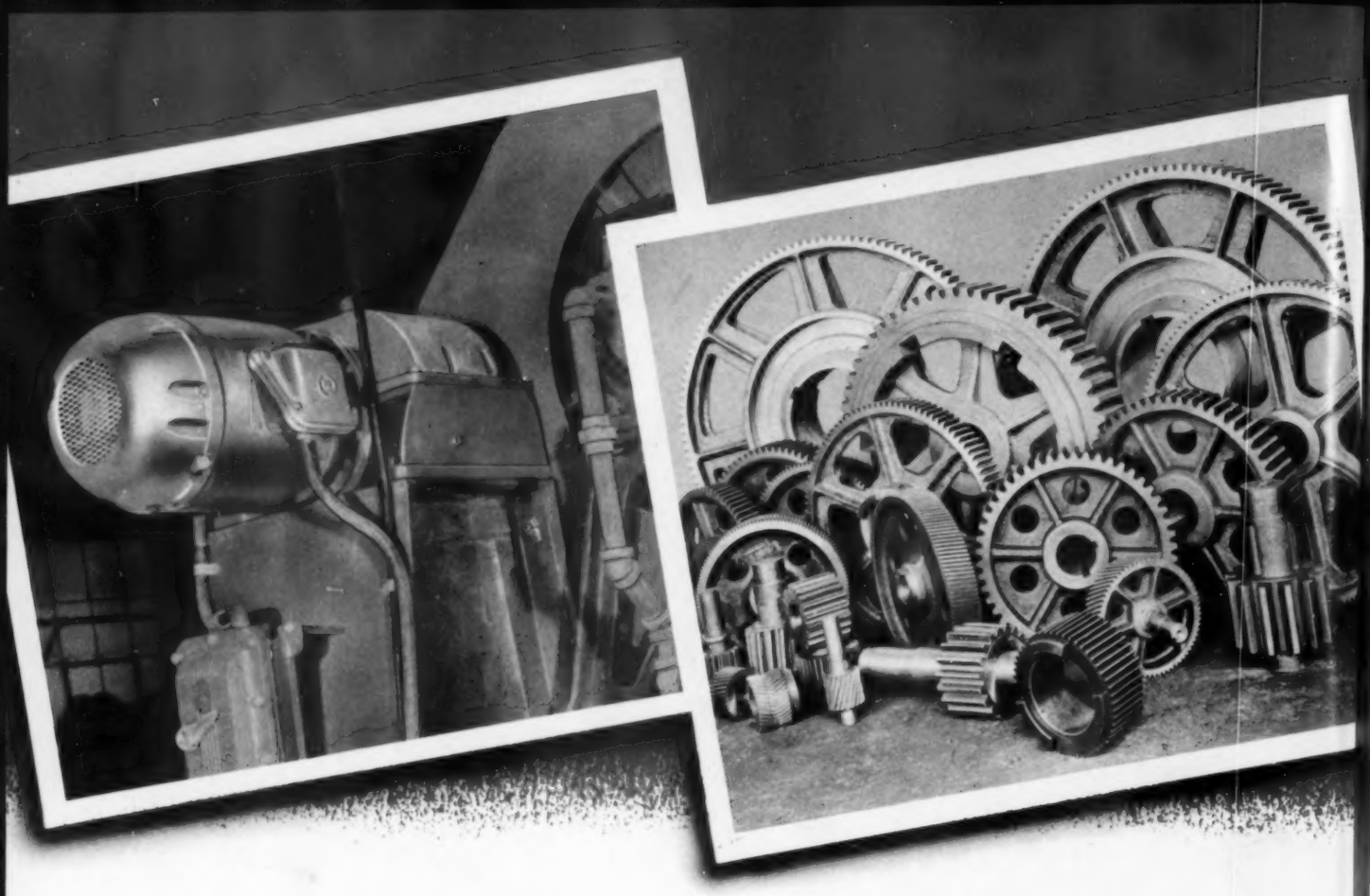

FOR DRIVES TO 75 HP,
USE WESTINGHOUSE GEARMOTORS—

Westinghouse Gearmotors are today's best answer for obtaining speed reduction on drive applications from 1 to 75 hp.

In addition to providing speed reduction efficiency averaging 96 to 98%, they increase work-flow through savings in floor space . . . provide greater flexibility of machine arrangement, permitting better co-ordination of functions. Maintenance is reduced . . . drive hazards are eliminated as no moving parts are exposed. Motor and reduction unit are attached directly to the driven machine . . . installation is easy.

LET WESTINGHOUSE SOLVE
YOUR INDUSTRIAL GEARING PROBLEMS—

Let Westinghouse geared-drive engineers save you the time and expense of figuring your open gearing requirements.

From application help to finished product, they are at your service.

Westinghouse has specialized facilities for the design, application and manufacture of spur, single-helical and double-helical gears . . . up to 10 ft. in diameter.

Prompt delivery can be provided in most types and sizes.

★ ★ ★

Depend on Westinghouse for help on your gearing problems. You buy undivided responsibility for design, manufacture and servicing of all electrical and mechanical components. Call your nearest Westinghouse office, or write for booklet B-3730. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-07263

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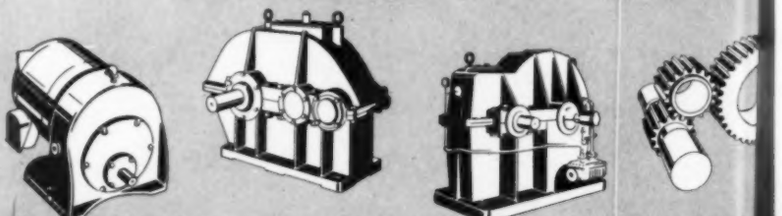
RPM FITTED DRIVES

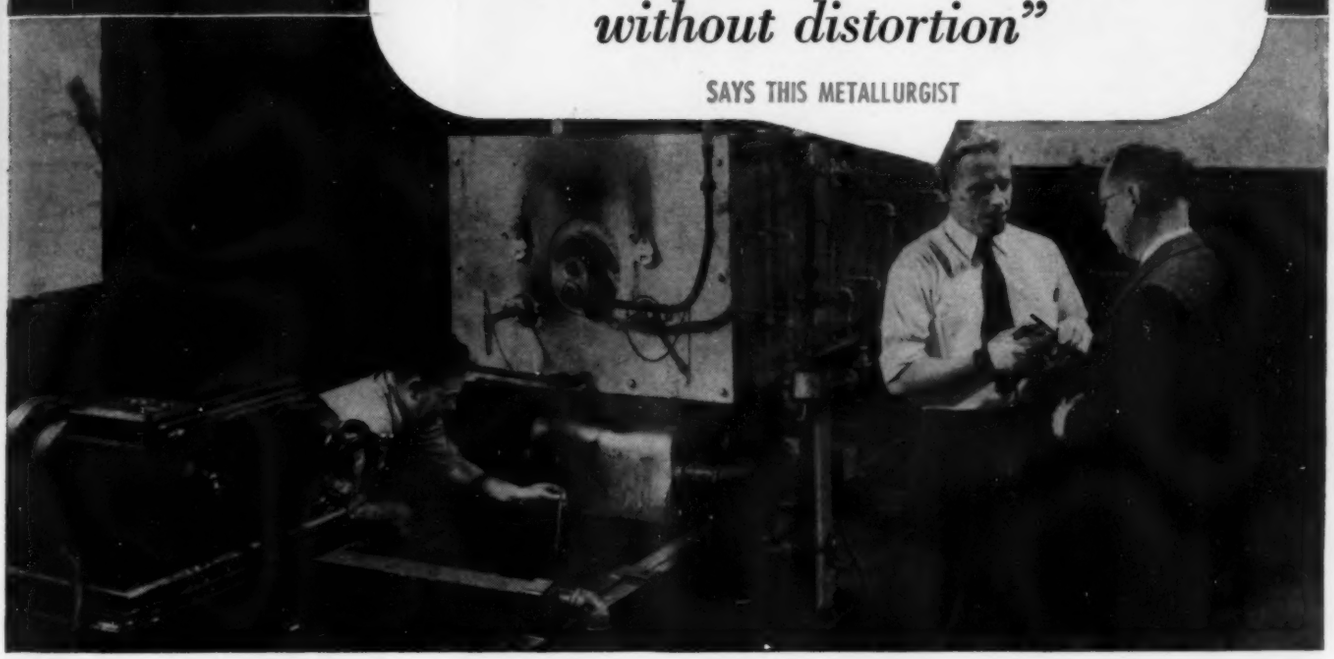


GEARMOTORS • SPEED REDUCERS • SPEED INCREASERS • INDUSTRIAL GEA

"WITH Gulf Super-Quench

we get uniform hardening without distortion"

SAYS THIS METALLURGIST



A metallurgist of the Corbin Screw Division, American Hardware Corporation, New Britain, Conn., consults with a Gulf Lubrication Engineer (right) on results obtained with Gulf Super-Quench in heat treating a wide variety of parts.

—and we eliminated the need for water quenching."

"TYPICAL of the wide variety of parts we harden in Gulf Super-Quench are roll thread dies," says this Metallurgist. "These are long flat pieces which require uniform hardness over the entire surface and deep penetration. With Super-Quench we obtain the desired hardness without the distortion we'd get from water quenching. Results with Super-Quench have been so outstanding that we have no need for a water-quench setup."

Here's why Gulf Super-Quench is a superior quenching oil: It has intensified dual-action—a faster cooling rate through the hardening temperature range, and the slow speed of conventional quenching oil below the hardening temperature range.

Call in a Gulf Lubrication Engineer today and let him show you how Gulf Super-Quench can help improve your quenching practice. For your copy of the brochure on Gulf Super-Quench, send the coupon below.

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Please send me, without obligation, a copy of the brochure, "Gulf Super-Quench."

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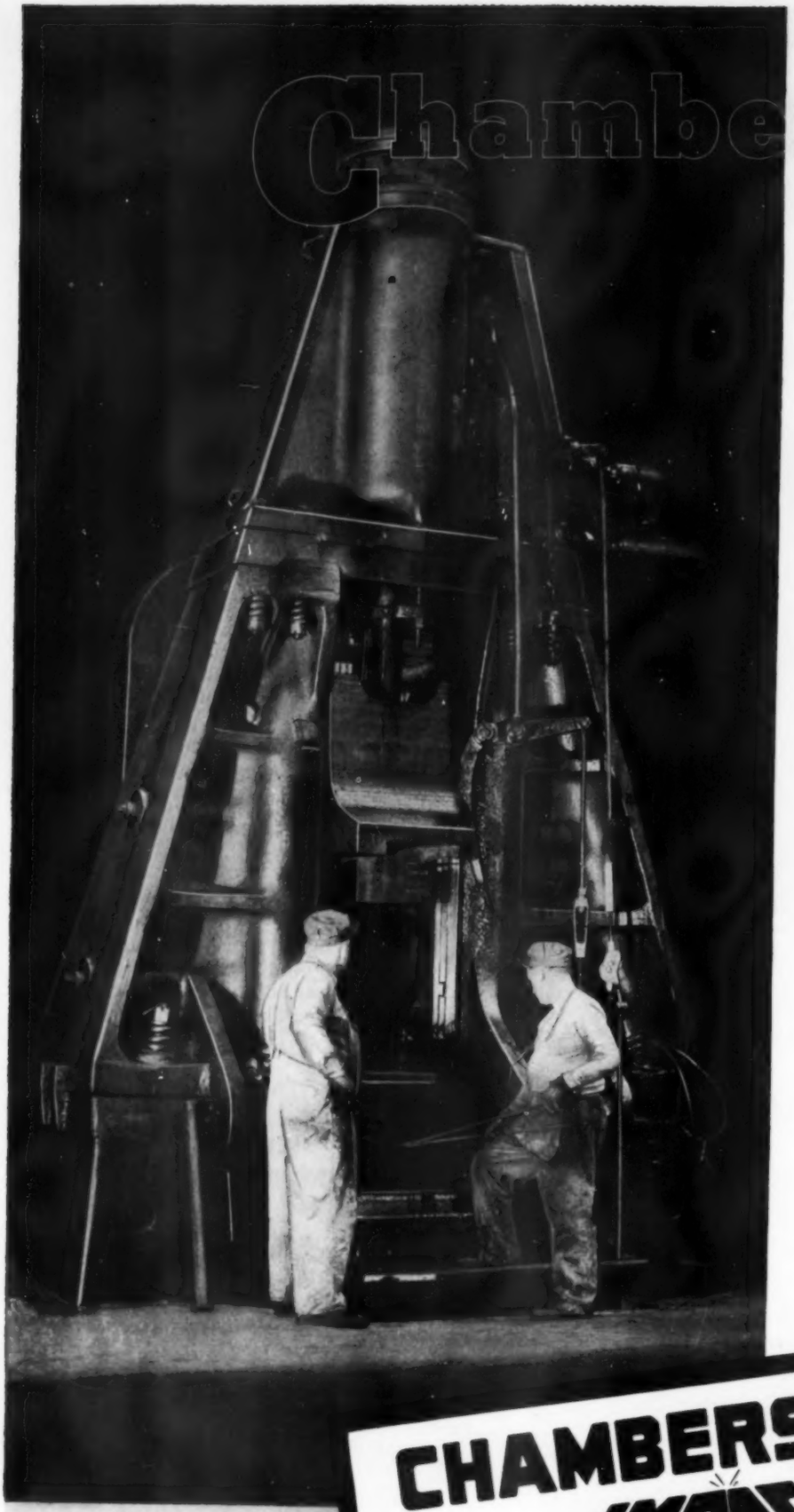

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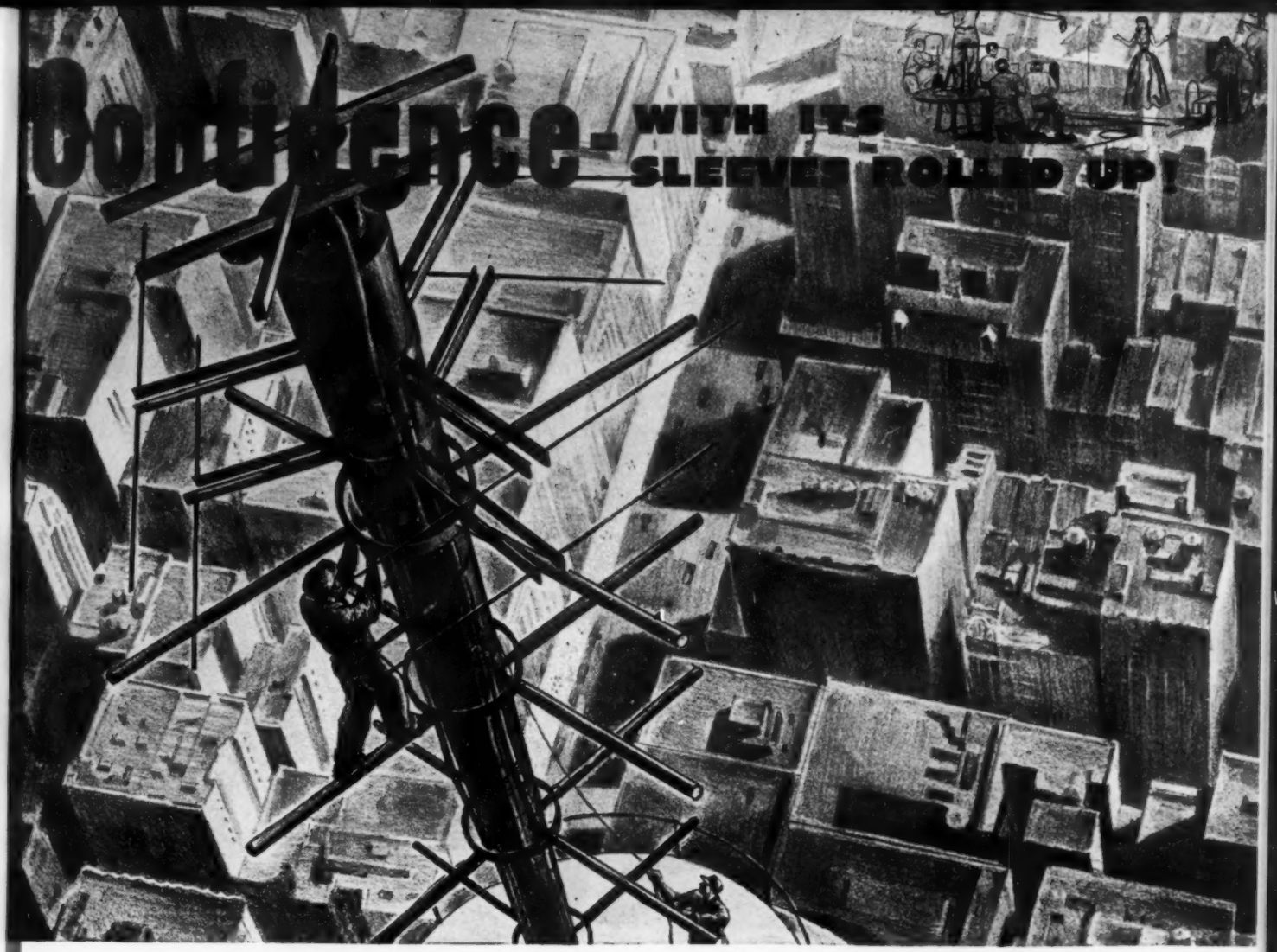
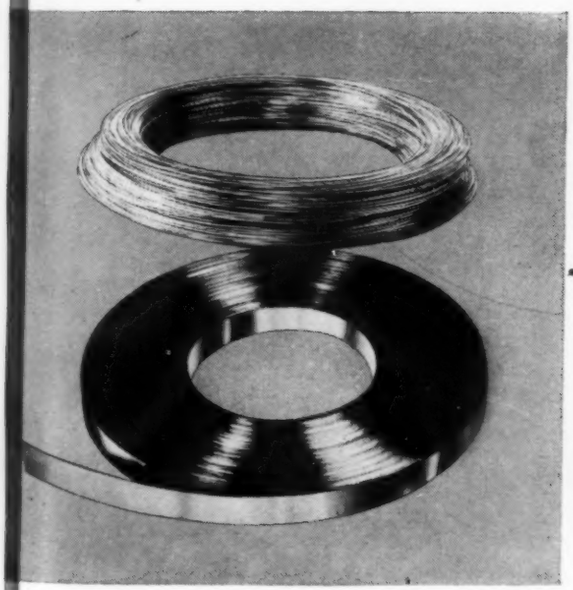
Builders of **IMPACT** *Machinery*





ATOP THE WORLD'S TALLEST BUILDING . . . yet not high enough! Television's need for unobstructed, long-range broadcasts may be met by planes in the stratosphere, relaying signals from the earth. Engineers working on this problem are confident of ultimate success.

With like confidence, Roebling blazes new trails in developing and making products vital to communication and all other industries. And the widespread confidence reposed in Roebling is our most guarded asset. Leadership is maintained only by constant progress . . . our ideal is to make Roebling products and engineering service the best obtainable anywhere, *any* time.

MILES LONG—AND EVERY INCH ALIKE!

SAME GAUGE, SAME FINISH, same analysis and strength from end to end . . . that's Roebling Wire! And because it's *uniform*, you can adopt it with complete confidence that it will give you peak production . . . eliminate unnecessary stoppages and cut down reject costs.

Whatever your requirements may be, Roebling probably makes a wire that meets them exactly. Flat, round or shaped it's available now—ready for immediate use in today's production.

Your Roebling Field Man has a broad practical knowledge of wire and the fabrication of wire products. He will be glad to help you choose the *right* wire for specific applications—aiming always at top performance and maximum economy. Write or call him at your nearest Roebling branch office.

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★ *WIRE ROPE AND STRAND* ★ *FITTINGS* ★ *SLINGS* ★ *SUSPENSION BRIDGES AND CABLES* ★ *AIRCORD, AIRCORD TERMINALS AND AIR CONTROLS* ★ *AERIAL WIRE ROPE SYSTEMS* ★ *ELECTRICAL WIRE AND CABLE* ★ *SKI LIFTS* ★ *HARD, ANNEALED OR TEMPERED HIGH AND LOW CARBON FINE AND SPECIALTY WIRE. FLAT WIRE, COLD ROLLED STRIP AND COLD ROLLED SPRING STEEL* ★ *SCREEN, HARDWARE AND INDUSTRIAL WIRE CLOTH* ★ *LAWN MOWERS*

"I thought I'd never dance again!"

How E-M services restored *more* than usefulness to a disfigured arm.

At first, it was feared she would be permanently disfigured—her arm was horribly injured in a factory accident. But Employers Mutual was determined not only to restore her usefulness—but to help her regain her good appearance.

Two years of anxious care and specialized treatment passed . . . and then, success! Dancing again, wearing short sleeves! Happiness again for her and her family, all because Employers Mutual wouldn't give up!

Employers Mutuals combine technical skill and long experience with warm, human understanding. Plants served by them become safer, more pleasant places to work . . . injured workers are assured of utmost care . . . a more friendly understanding between workers and management results!

Employers Mutuals' nationally recognized accident prevention and industrial health programs, and reputation for speedy, equitable claim adjustment are based on a sincere desire to conduct the policyholders' insurance affairs as the policyholders would have them handled. This is a fresh conception of insurance service which you can enjoy.

Employers Mutuals write: Workmen's Compensation—Public Liability—Automobile—Group Health and Accident—Burglary—Plate Glass—Fidelity Bonds—and other casualty insurance. Fire—Extended Coverage—Inland Marine—and allied lines. All policies are nonassessable.

Now, you may have Group Insurance for your employees handled in the same human, friendly fashion which has characterized all other forms of Employers Mutuals insurance. Send for new booklet, "Your Industrial Relations Program." It will give you a better understanding of this important service. Have you sent for your copy of the Employers Mutuals' "Dictionary of Insurance Terms?" It clarifies the meanings of insurance terms for the busy man. Send for them on your letterhead today—or call your local Employers Mutuals representative.

Employers Mutuals Policies Protect Lives, Health and Property

EMPLOYERS MUTUALS OF WAUSAU . . . make insurance understandable

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HOME OFFICE: WAUSAU, WISCONSIN
Offices in Principal Cities—Consult Your Telephone Directory

New Bliss Presses for Nash Bodies

Bliss presses are rugged production equipment, easy to install, adjust and repair. That's why they're favored at Nash's Milwaukee body plant, as they have been ever since Nash first started building cars...why they predominate on practically every one of its stamping set-ups.

The majority of the presses in the Nash Body Plant *are Bliss-Built*. They range from a three-ton capacity bench press for riveting small sections to a battery of 500-ton fully enclosed presses recently installed for the production of side quarter panels.

You'll find similar case histories wherever you look in the automotive industry—in fact, *every* industry that depends upon pressed-metal production. That's because Bliss builds and delivers more than a press. It provides a fund of engineering knowledge, going back 90 years, for its maximum production. That's why Bliss on your press is more than a name—it's a guarantee! Let a Bliss sales engineer help you get the most out of your presses. Send for him today.

E. W. BLISS COMPANY, DETROIT 2, MICHIGAN

Mechanical and Hydraulic Presses, Rolling Mills, Container Machinery

WORKS AT: Toledo, Cleveland, Salem, Ohio; Hastings, Mich.; Englewood, N. J.; Derby, England; St. Ouen sur Seine, France • SALES OFFICES AT: Detroit, Hastings, Mich.; New York, Rochester, N. Y.; Cleveland, Dayton, Toledo, Salem, Ohio; Philadelphia, Pittsburgh, Pa.; Chicago, Ill; New Haven, Conn.; Windsor, Ont.

Side quarter panels for Nash cars undergo a series of forming and trimming operations in this battery of Bliss enclosed single action presses. The presses in the foreground are 124" between uprights and deliver 500 tons pressure at bottom of stroke.

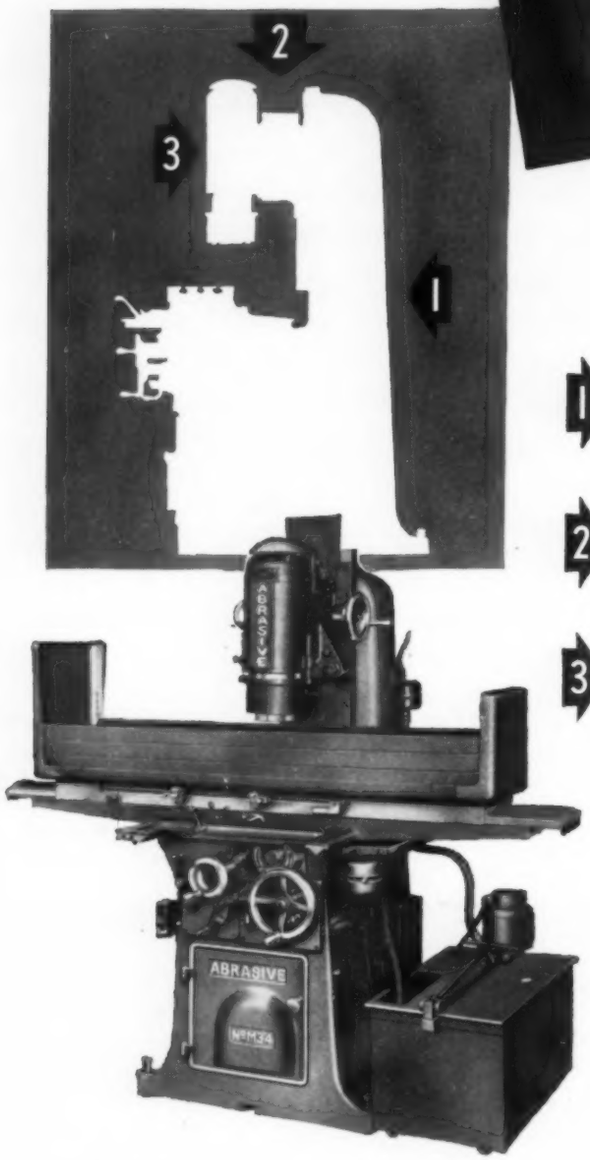
The wide and deep bed of this 500-ton Bliss enclosed press is utilized to full advantage in production of Nash running board aprons. Double dies are used to pierce five holes in each of two aprons with each stroke.

MARQUETTE · BLISS · CONSOLIDATED · TOLEDO · BLISS BUILT

BLISS BUILDS MORE TYPES AND SIZES OF PRESSES THAN ANY OTHER COMPANY IN THE WORLD

STRONG

WHERE STRENGTH BOOSTS PRODUCTION



ABRASIVE M-34
Vertical Spindle Grinder

1 **STRONG** one-piece bed and pedestal casting (1540 lbs.) ribbed for ruggedness—prevents distortion, minimizes vibration.

2 **STRONG** spindle mounting — very short overhang — is gibbed to column along full length of the vertical ways.

3 **STRONG** motorized spindle — a self-contained cartridge-type unit, with SKF support for spindle and wheel, gives true, smooth grinding.

The Abrasive M-34 Vertical Spindle Grinder is built for long, productive service. It has strength for hogging off metal on deep cuts — strength for holding close tolerances and producing fine finishes. The grinding wheel is driven directly by the full power of the 5 HP motor. It's easy to operate, too: spindle downfeed is automatic . . . longitudinal table travel is automatic and hydraulically cushioned for shock-free, smooth running. For accurate grinding of flat work such as spacers, washers, parallels, etc., the **Abrasive M-34** is a fast producer in tool room, machine shop or production line.

Write for Bulletin

SPECIFICATIONS
Work Capacity: 24" long, 8" wide, 12" high. Spindle: Built-in 5 H.P. motor, 3450 r.p.m., Pope SKF ball and roller bearing. Wheel size: Segment Type, 6" diameter. Table Size Overall: 59" x 10½". Net Weight: 3000 lbs.

ABRASIVE
ACCURACY BOOSTS PRODUCTION

ABRASIVE MACHINE TOOL CO.
EAST PROVIDENCE 14, RHODE ISLAND

WAREHOUSE STOCK

Why they think of WARD when it's SPRING STEEL

BLUE TEMPERED SPRING STEEL

Many Hundreds of Sizes

.002" to .065" in thickness—.95 to 1.05 Carbon

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COLD ROLLED ANNEALED SPRING STEEL

.003" to .183" in thickness—.70 to .80 Carbon

—.90 to 1.05 Carbon

CLOSE TO A THOUSAND SIZES IN STOCK — AND COMPLETE SLITTING AND SHEARING EQUIPMENT ENABLE US TO FILL PROMPTLY THE MAJORITY OF ORDERS RECEIVED

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WAREHOUSE SHIPMENTS ONLY ON THE ABOVE SPRING STEELS

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AMES

FOR GREATER PRODUCTIVITY

You'll find this AMES No. 1 DIAL COMPARATOR a great aid in meeting your increased production schedules. It's *accurate*, first,—but *ease*, *impersonality*, and *speed* in measuring are also very evident. And they'll all be evident for thousands of readings—contributing low-cost maintenance to low initial cost—giving you highest quality measuring with the greatest possible economy—in dollars, time and human effort.

Ames indicators in any size or dial graduation may be attached. The No. 211 shown is graduated in .0001", has dial reading 0–5–0, and a range of .025".

Specifications

Capacity under contact:	2"	Height, overall:	9½"
Table diameter:	2"	Throat, contact to column:	1½"

Weight: 4 lbs.

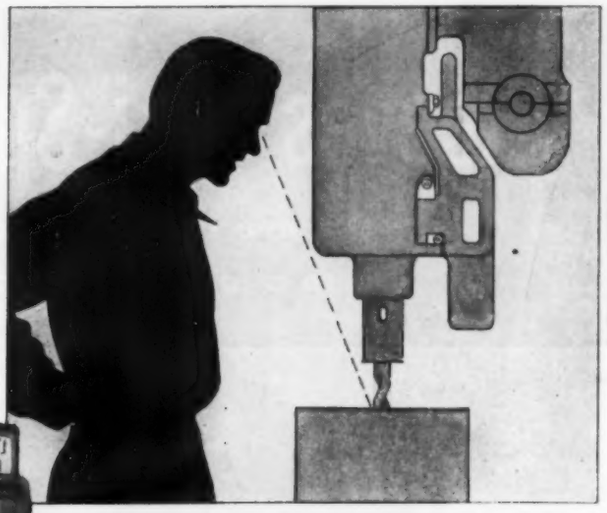
For information on our full line of Comparators and many other measuring instruments, address our Home Office:
26 Ames Street, Waltham 54, Mass.

B. C. AMES CO.

Mfr. of Micrometer Dial Gauges
Micrometer Dial Indicators

Representatives in principal cities

Powerful-



With the arm low or high, the operator always sees the work. Note the very slight projection of the Cincinnati Bickford head beyond the spindle.

Safe-Versatile-

Very powerful—very rigid—and yet extremely easy to handle.

All controls on the head low and close to the operator's hands, saving physical effort and giving the operator a clear view of the work on all jobs.

Outstanding safety features include Safety Elevating Nut, Spindle Catch, Power Rapid Traverse Safety, Feed Safety Clamping and Elevating Safety Interlock.

36 speeds and 18 feeds (4 speed ranges are optional) give a wide range of performance and versatility.

You may expect a sustained quality of work and fine production from these machines.

THE CINCINNATI BICKFORD TOOL CO.
RADIAL AND UPRIGHT DRILLING MACHINES
SUPER SERVICE

Radials 7½" dia. col., 2½' arm, to 26". dia. col., 12' arm.
General purpose Uprights, 21" to 28" sizes.
Production Uprights, 21" to 28".
Jig Borers, Portable Horizontals, Spacing Table Machines.

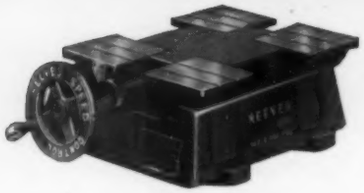
Equal Efficiency of Every Unit Makes the Balanced Machine

Write for Bulletin R-29, and check the outstanding design and construction features.

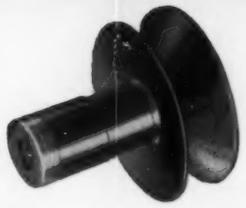
THE CINCINNATI BICKFORD TOOL CO. Cincinnati 9. Ohio U.S.A.

Reeves Vari-Speed Motor Pulley

converts any standard constant speed motor to a low-cost stepless variable speed drive . . .



1. REEVES Motor Base provides sliding platform for motor. Handwheel or push-button control increases transmitted speed by moving motor toward driven machine, decreases speed by reversing the operation.



2. Disc Assembly connects directly to motor shaft. Assembly consists of two facing cone-shaped discs—one sliding laterally—and compression spring for mounting on motor extension shaft.

3. Special V-Belt hooks up unit with driven machine. Belt fits between discs and over pulley on power input shaft of driven machine. Belt is adjusted to minimum center.

Result: INFINITELY VARIABLE SPEED WITHIN 4:1 RATIO

Unit instantly delivers any desired speed over entire range and maintains that speed without fluctuating even a fraction of an rpm.

The REEVES Vari-Speed Motor Pulley is the easiest, lowest-cost method of converting a machine with fixed speeds into a highly versatile unit of infinitely variable speed adjustability. Thus equipped, it can handle a wider range of work, better, faster and more economically, because machine speed can be changed instantly and accurately—without shutdowns—to meet the needs of every operation and every operator, *under every changing condition.*

This REEVES unit forms the actual driving element between motor and driven shaft . . . eliminates all auxiliary equipment such as chain drives, gears, belts, etc., . . . requires virtually no more space for installation than any standard belt or chain drive. It is built in eleven sizes, transmitting from 1/8 to 15 hp. over speed ratios from 2 1/4:1 to 4:1, inclusive.

The complete line of REEVES Speed Control equipment also includes two other basic units, the Variable Speed Transmission and the Motodrive, which are offered in the widest selection of designs, sizes, capacities and speed ratios—with handwheel, push-button or entirely automatic controls.

REEVES units have proved their ability to speed production, cut cost and increase profit in more than 260,000 widely diversified industrial applications . . . are listed as standard equipment on over 2,100 different makes of modern machines.

An experienced REEVES Speed Control specialist will be glad to work with you in selecting the units best suited to your needs. Write today, arranging an interview, and ask for the comprehensive 114-page catalog A-450A.

REEVES PULLEY COMPANY • COLUMBUS, INDIANA

Recognized Leader in the Specialized Field of Speed Control Engineering

ACCURATE • VARIABLE

Reeves Speed Control

GIVES THE RIGHT SPEED FOR EVERY JOB!

SPOT NEWS OF METALWORKING

Warner & Swasey Co., Cleveland, will start production of textile weaving machines immediately, with initial deliveries scheduled this year. President Charles J. Stilwell says company has capacity to make 3000 units annually. Operations will not interfere with manufacture of machine tools.

Ten Norwegian electrical and mechanical goods firms are establishing a centralized tool making and production engineering company. Equipment for this enterprise is to be bought in this country by B. Hellern, whose headquarters are at the Norwegian Industries Commission, 115 Broad Street, New York City.

More plastics for functional parts and less for decorative purposes is the trend at Ford. Dash panel next year will be a die casting instead of a large molding.

Two-thirds of Cleveland's larger metalworking plants will close for vacations this summer. Thirty-nine factories employing 31,000 will be down for one week, and 42 plants with 43,000 workers for two weeks. Most vacation periods will begin July 5.

Gas-turbine automobile engines, basically scaled down from airplane engines, are being tested by two British companies. Rover Co., Ltd., Birmingham, has a 100-hp unit which has been tested more than 60 hr. Centrax Power Units, Ltd., London, has a 160-hp gas turbine engine considered suitable for motor buses and heavy trucks.

RFC will buy some $25 million of metalworking equipment, including $8 million of machine tools, intended for delivery to Russia and her satellites and ordered prior to last January 15, according to bill introduced in Congress with administration backing. These machines are in hands of builders who cannot get export licenses for them.

Featherbedding note: Motor car company redesigned its truck cab to eliminate 24 in. of torch or arc-welded seams where parts are joined. It then bought new dies and got wide sheets of steel to make the cab in one press stroke. Finishers and welders are still in the cab department, on union insistence, receiving the same pay as formerly on lower rated jobs. Cost in manhours thus stays the same.

Briggs Mfg. Co. will produce Willys body stampings and parts for trucks and other vehicles and for station wagon bodies, beginning August 1. Shipments will be trucked to Toledo from Briggs' Meldrum Ave. plant in Detroit.

Johannson Gage Division of Ford has been sold to Brown & Sharpe Mfg. Co. and will be moved to Providence, R. I. Sale includes right to use trade name "Johannson" in western hemisphere, plus patents, methods and machinery employed in manufacture of Jo-Blocks. Johnannson products have been made by Ford since 1923.

Kelvinator has set up its own plastics molding plant in Milwaukee to make refrigerator parts. A number of parts, including bottom bin sliding on nylon runners, will be molded from polystyrene.

Dave Beck's powerful AFL Teamsters' Union is trying to take over 5000 Boeing workers involved in a strike called by Aeronautical Mechanics Union at Seattle. AMU is affiliated with International Association of Machinists. Teamsters' Union says its members were thrown out of work without being consulted and Boeing has transferred elswhere much production which never will be brought back to Seattle.

Gaging Metalworking

Business in metalworking promises to boom the remainder of this year. For one thing, ERP and a $4.8 billion tax cut have wiped out the soft spots which began to show in March. The prospect for bumper crops is good, and that means high purchasing power by farmers. It also means that food prices should not rise more than a few points farther, leaving considerable income to be spent on other goods.

▸ The $3-billion-plus program for air power added onto these other factors practically guarantees peak output. In appraising the outlook, one should remember that wages still are climbing faster than the cost of living. They have more than doubled since 1939, while prices are up two-thirds.

Purchasing Power Is Adequate

All in all, there seems to be enough purchasing power to absorb all the production that metalworking industries can turn out, though some groups whose incomes are fixed are being pinched by rising prices. Nevertheless, the economy appears closer to a balance than it has been at any time since the end of the war.

▸ Industry is buying an unusually large proportion of equipment this year in relation to total plant-and-equipment purchases. Measured in 1929 dollars, 1948 equipment expenditures will be almost double the 1926-1930 average. Capital spent for new plants, on the other hand, will be only three-quarters of that average.

Machinery Orders Are Up

The smart upturn in new orders since February is the most tangible sign of good business ahead in metalworking lines. Commerce Department figures reveal that bookings of industrial and electrical machinery hit a peak of 3½ times the 1939 level last November, then dropped some 15% by February. Early in March, new orders began to pick up again, recovering in one month almost all the ground lost in the preceding three months. Since March, orders have been excellent.

▸ It is significant that this recovery in machinery bookings got under way before President Truman's call for a defense program, before Congress approved ERP, and before tax reduction became law. It demonstrated the underlying soundness of metalworking business.

Shortages Loom Ahead

Everything isn't rosy, however. There are not enough materials to go round. Should there be another coal stoppage, available steel tonnage will shrink more. Manpower shortages loom here and there in local spots; the situation is likely to get worse rather than better.

▸ The labor outlook is much brighter, now that General Motors and Chrysler have signed new contracts. The third-round pattern is pretty well fashioned, and chances of major strikes are slimmer than they were.

Machine Tools Ordered for Defense

Initial machine tool orders for the plane defense program have been placed. Builders took them reluctantly, because they will be subject to renegotiation. Defense business is not expected to rush in, but by the end of the year some $50 million should have been booked. ERP orders may be much slower than defense orders in coming through. It is a safe guess, however, that backlogs of machine tool builders will be considerably larger next January 1 than they are today.

▸ New machine tool orders in April were at 86.3 on the index of the National Machine Tool Builders' Association (average shipments 1945-1947 equal 100). That is the same as in March.

▸ Export bookings of machine tools have stayed fairly constant all year, based on the NMTBA index. They were at 14.1 in April, down from the 16.1 figure in March but up from the 12.7 record during February.

▸ Sales of the gearing industry during April amounted to 320.9 on the index of the American Gear Manufacturers Association (1935 - 1939 equals 100). That represented a decline of 17.6% from March.

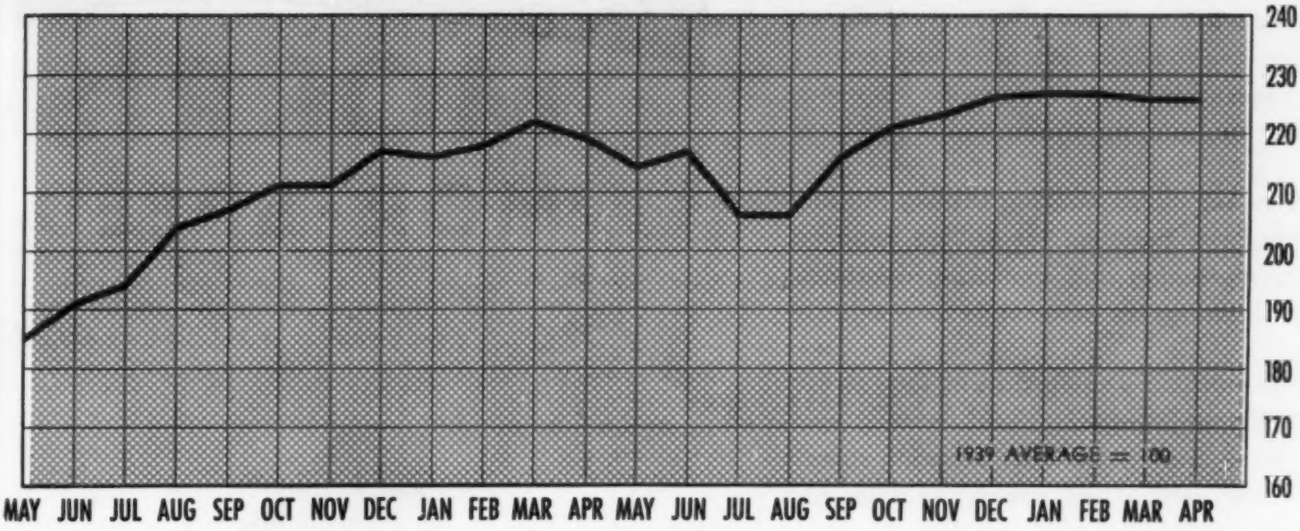
Steel Is Key to Future

The materials situation is more critical in spots than at any time since the end of the war. As one manufacturer puts it, "We are plagued right and left by regulations, strikes, government stockpiling, inflation, arms demand, allocations, freight increases. The factors make us fear that prices will go higher."

▸ Steel, more and more, holds the key to metalworking's future. Steel supply is limited by the physical capacity of the industry and by the coal problem. Demand for steel will

DATA: DEPARTMENT OF COMMERCE

American Machinist INDEX OF METALWORKING PRODUCTION



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continue in excess of production for at least another year.

One Month's Sheet Output Lost

Steel allocations for oil and gas pipelines, housing, freight cars and agricultural implements are playing hob with the supply for other users. In sheet steel, one month's production or more was lost by the coal strike. Most of this lost tonnage will be felt in shipments in June and early July. Rather than permit backlogs to be piled up higher, steel mills either cancelled out a month's shipments to customers or reduced allocations over a longer period.

▸ Hot-rolled sheets stood the brunt of the slashing. Cold-rolled sheets were favored because they are a more profitable item. The automobile industry lost less steel than some other users; they are heavy consumers of cold-rolled items.

Harder To Make Conversion Deals

Sheet and strip steel shipments from mills during the third quarter should be back up to the record-breaking first-quarter rate. The only deterrent will be vacations and any periods of excessively hot weather. The point is that any unbalance in users' operations caused by the dip in steel deliveries probably won't be remedied until late in the third quarter of this year.

▸ Conversion deals aren't as easy to arrange as they used to be. They are dependent largely upon steel-making capacities of alloy mills, which are in the process of being absorbed, at least partially, by the defense program requirements.

▸ The coal strike had a more devastating effect upon structural steel than upon flat-rolled, taking as much as six-weeks' supply out of the market. Plate too is critical.

Copper Outlook Is Drab

Pig iron will remain a "short-supply" item for some time. A number of small foundries have been compelled to curtail output drastically or to shut down completely because of this shortage.

▸ Domestic demand for copper stays much higher than domestic production. The outlook is not encouraging. ERP and government stockpiling must be added onto other claimants for the available copper. Some copper producers are insisting upon selling on a month-to-month basis and are refusing to guarantee shipment of any stated tonnage. Reason: the uncertainties arising from government purchases and European needs.

▸ One important copper user figures that it may not be able to get much more than 70% of its estimated consumption over the remainder of the year. The situation is not as bad as it sounds, however. The company has acquired a reserve which will protect it during that period.

Tin Demand Is Terrific

Tin, like other materials, shows no signs of easing. The world demand is terrific, exceeding supply by a wide margin. The situation is aggravated by the stockpiling policy of the government which is becoming increasingly aggressive.

▸ U. S. consumption of tin, without controls, might soar to 115,000 tons this year, compared with 87,500 tons under restrictions. Removal of controls would have the effect of shooting up the price to higher levels.

▸ No improvement in lead supply is anticipated before fall. Many users still are in bad straits. The recent increase in price has not eased demand at all.

▸ Aluminum rivals steel for top spot in the critical list. Pig and ingot production cannot be raised because of lack of sufficient power. The exact position that users will be in will not be known until the actual down-to-earth requirements of the plane program are determined.

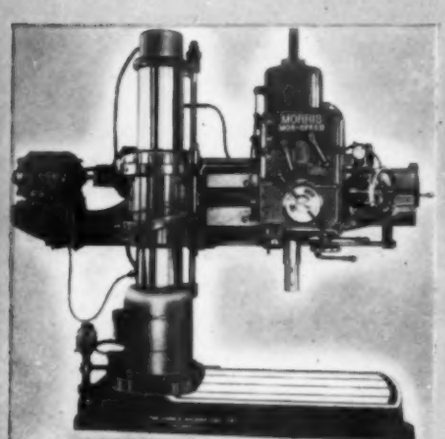
DESIGNED TO MEET YOUR SPECIFIC NEEDS . . .

MORRIS MOR-SPEED *Production Machines*

In a great many instances greater production is the only answer to rising costs. To help you meet this problem of increased costs Morris offers the Mor-Speed line of production machines each one engineered to meet your specific job needs. For example, the Hydraulic Vertical 6-station Automatic Indexing Drilling Machine has been designed for drilling, reaming, counterboring and spotfacing operations on housings for automobile oil pumps.

The machine is equipped with four vertical drill spindles—two vertical reaming spindles — one vertical counterboring spindle —one vertical spotfacing spindle and three horizontal drill spindles. Six hand clamp holding fixtures enable operator to load and unload machine easily and quickly at each indexing of machine.

If your work calls for multiple operations on high production jobs consult Morris. Morris has available the engineering skill —manufacturing experience and facilities to help you obtain greater production and lower costs from equipment designed to meet your specific needs.



MORRIS MOR-SPEED

Builders of MOR-SPEED *Line*

The MORRIS *Machine Tool Co*

CINCINNATI 3, OHIO

American
Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

The "Annual Improvement Factor"

You are likely to hear a lot about a new term: annual improvement factor.

It sprang into being as a result of the recently announced General Motors-United Automobile Workers settlement.

What it amounts to is this — the corporation agrees to pay its employees three cents an hour more each year "to increase their living standards." The boost will be made regardless of other provisions in the contract. It is to take care of the annual improvement factor.

That is a fascinating term: annual improvement factor. It is a term which might well be applied as a measure of overall production efficiency.

Let's assume that wage rates per hour stay up in the sky. They are, in fact, more likely to go up farther than down.

Add to them the soaring costs of materials and, for that matter, costs of all kinds.

It is high time then to look closely at the cost of your product if you expect to continue to make a profit.

You can't hope to get your costs down if you fumble and fiddle with old equipment. The answer is to achieve greater productivity per man by means of increased mechanization. That gets us to the annual improvement factor.

America went ahead of all other countries in industrial development because its manufacturers valued the annual improvement factor (though such a high-brow name did not occur to them). Examine the rise in productivity per manhour through the years and see for yourself.

The war gave a setback to the upward march in productivity. In general, productivity is still below the level at the outbreak of World War II.

Today the urge to get productivity back up is tremendous. The best way to do it is to put to work the annual improvement factor as applied to your production processes.

That means a constant check on your plant equipment to see that it is performing efficiently and economically.

It means a vigil against keeping old equipment around until it costs you money instead of making money for you.

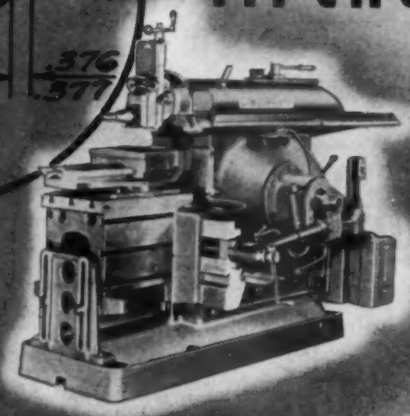
It means tooling your machines so that you get the most out of them instead of utilizing only part of their productive capacity.

The application of an annual improvement factor to your machines will be good business.

Burnham Finney

EDITOR

KEY WAYS
...the right way!



. . . . Internal shaping is another function of the Shaper requiring accurate performance. Here a Cincinnati Shaper holds close tolerances cutting Kennedy Key Ways in an eccentric.

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SHAPERS · SHEARS · BRAKES

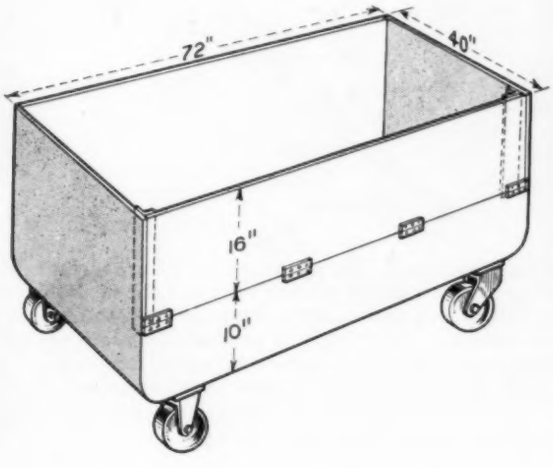
TOOLING TECHNIQUES

at Presteel

Worcester (Mass.) Pressed Steel Co. is really a big contract shop, hence must authorize tooling job by job. Typical inexpensive setups are pictured here

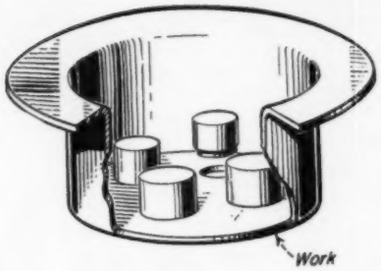
BY E. J. TANGERMAN
MANAGING EDITOR

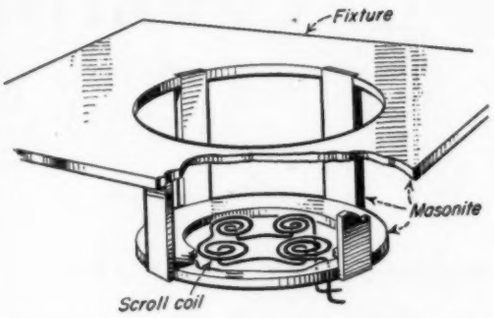
Magnesium Tote Tucks . . . One sheet of ¼-in. magnesium plate 10 ft. long, bent into ends and bottom, is sealed with another sheet in back and provided with a trap door in front. All joints are welded. Mounted on casters bolted directly to bottom with no reinforcement, trucks have been used to carry steel stampings for past two years, have proved entirely successful. Weight is about 200 lb., capacity 43 cu. ft. Zinc chromate primer prevents electrolysis when casters, hinges, etc. contact magnesium



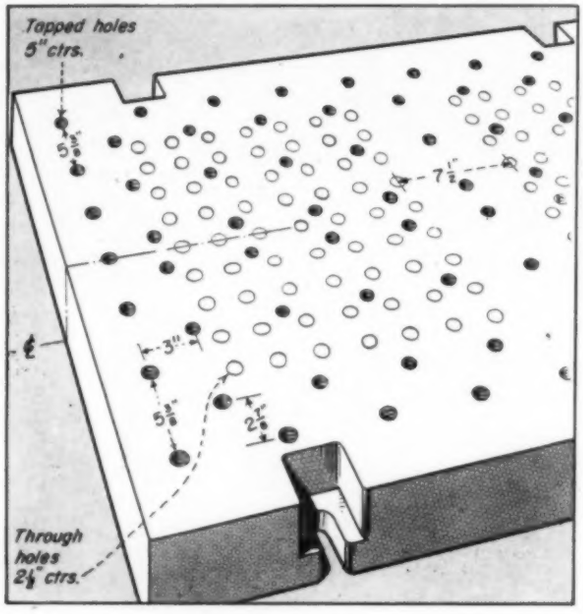
Portable Workbench . . . Die setters in press shops have individual rolling tables. Press-bed height and steel-plate topped, tables are heavily built so they can carry a die. They have built-in tool drawers which lock, with a sided shelf below. Each carries the man's name, is rolled on casters to machine being set up. As each man cares for machines in a certain area only, he can keep needed tools and parts accessible

Pantographic Press Guard... A special "accordion" press guard has been developed for C-frame presses. It is in effect a pantographic gate with one arm driven from ram, the other from bolster or bed. The gate pushes arms out of the danger zone. Where one hand only is used in danger zone, a modified single form can be used, having a gate on the one side only

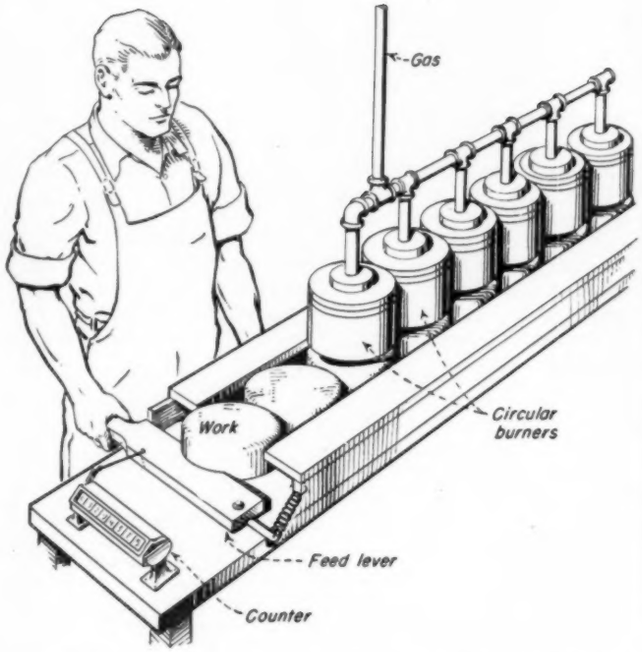




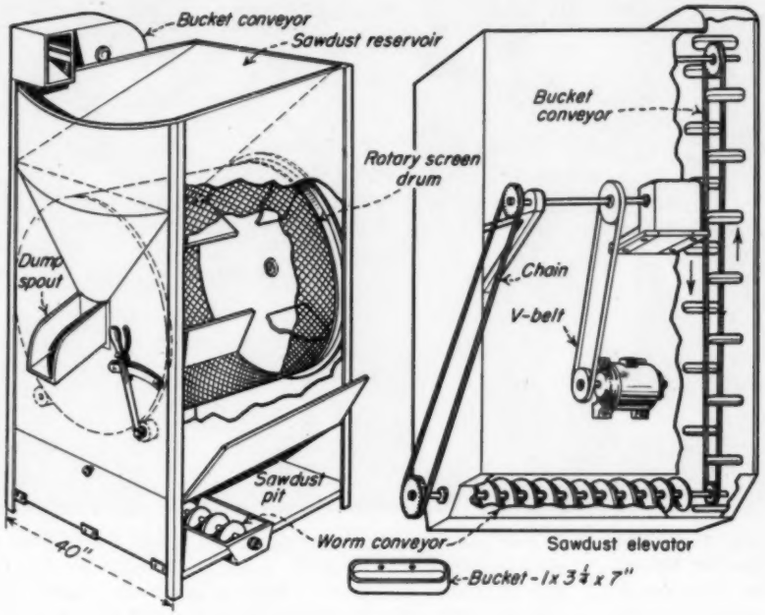
Induction Brazing... To braze four studs into holes in a bowl-shaped pressing, induction heat is used. Spiral tubes are positioned under each in a masonite base, heat the piece to proper temperature in 1 min.



Pre-drilled Press Bolsters... To avoid lost time in normal drilling of bolsters to suit each die, some holes are drilled through, some tapped 2 in. deep in a regular pattern over the bolster. Drilled holes are 1 1/16 in., tapped holes 1 in., 8 thd. All holes are countersunk 1/16 in. Dies from now on will be ordered to some multiple of this spacing

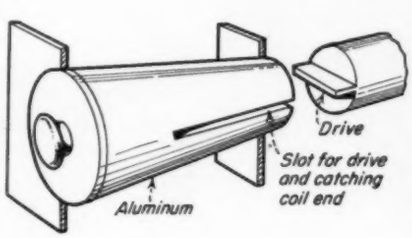


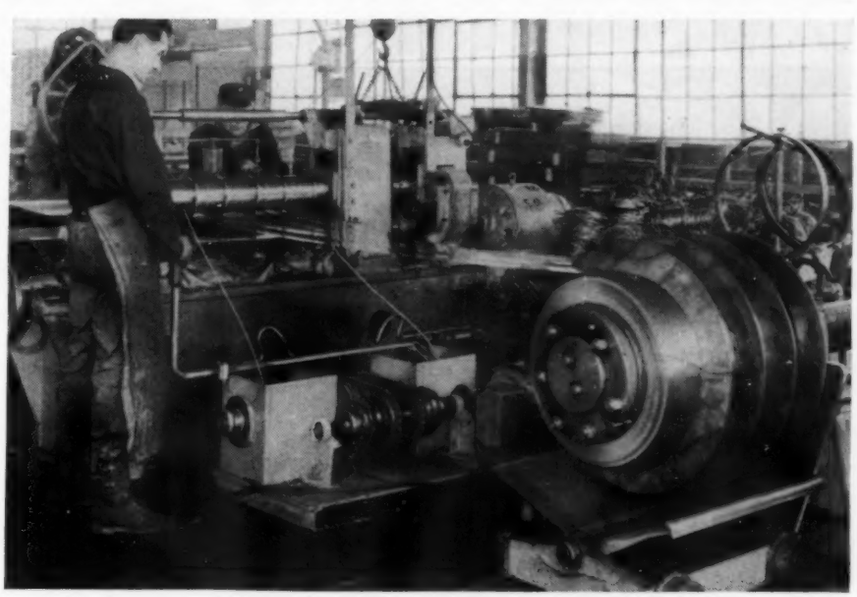
Annealing Fixtures... To anneal small parts, several gas-heated progressive fixtures have been developed. Each has a series of burners over a slide. Parts are fed singly under these burners by a lever set to a stroke which will position pieces exactly under each burner in turn. Levers may be pedal or hand operated and operate counters as well. Parts air-cool in tote boxes below end chute, into which they are pushed when they reach required heat

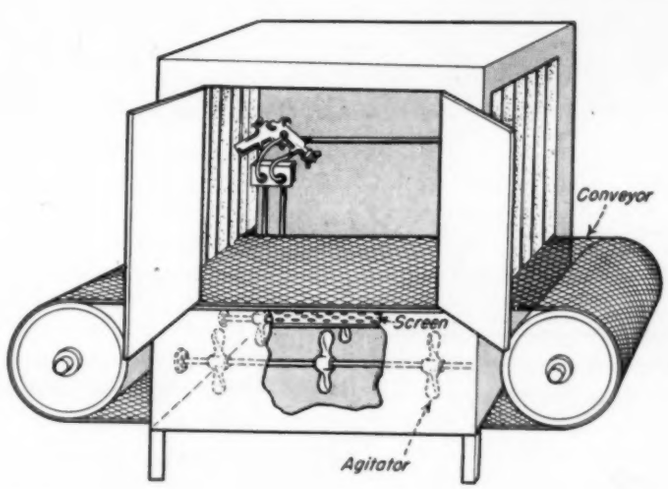


Burring Small Parts . . . Many small steel and brass parts are tumble-burred with granite chips in a wood-lined barrel. To separate small steel parts from granite, a magnetic separator drum is used. For brass, a shaker table does the job—simply a perforated tray reciprocated by an arm driven by an eccentric on a gearmotor. When parts must be dried, they are put into the end of a horizontally rotating barrel of perforated steel. Sawdust from a hopper above is fed in upon them through a gate, much as ingredients are put into a concrete mixer. Sawdust absorbs moisture and drops through perforations into a base box, from which a screw conveyor carries it to an elevating conveyor (made up with pans from one regular job). To unload, a gate within the drum is dropped, so parts are fed out

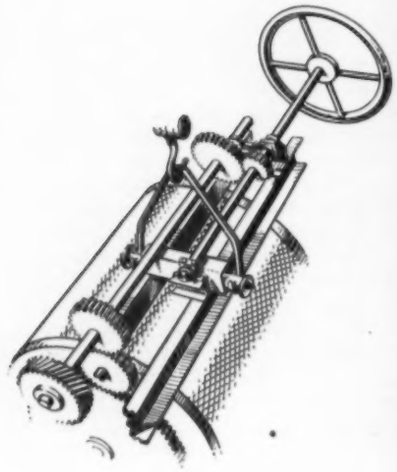
Safety Scrap Coiler . . . To dispose of edge scrap at slitting rolls, a simple coiler has been developed. Two tapered aluminum mandrels are bayonet-driven by two slipping clutches. The scrap end is fed in at either side and coiled around the mandrels as the rollers cut it off. The operator can pull a pin at any time and remove the tight-coiled scrap, can direct winding with a slider above. The clutch protects him against injury



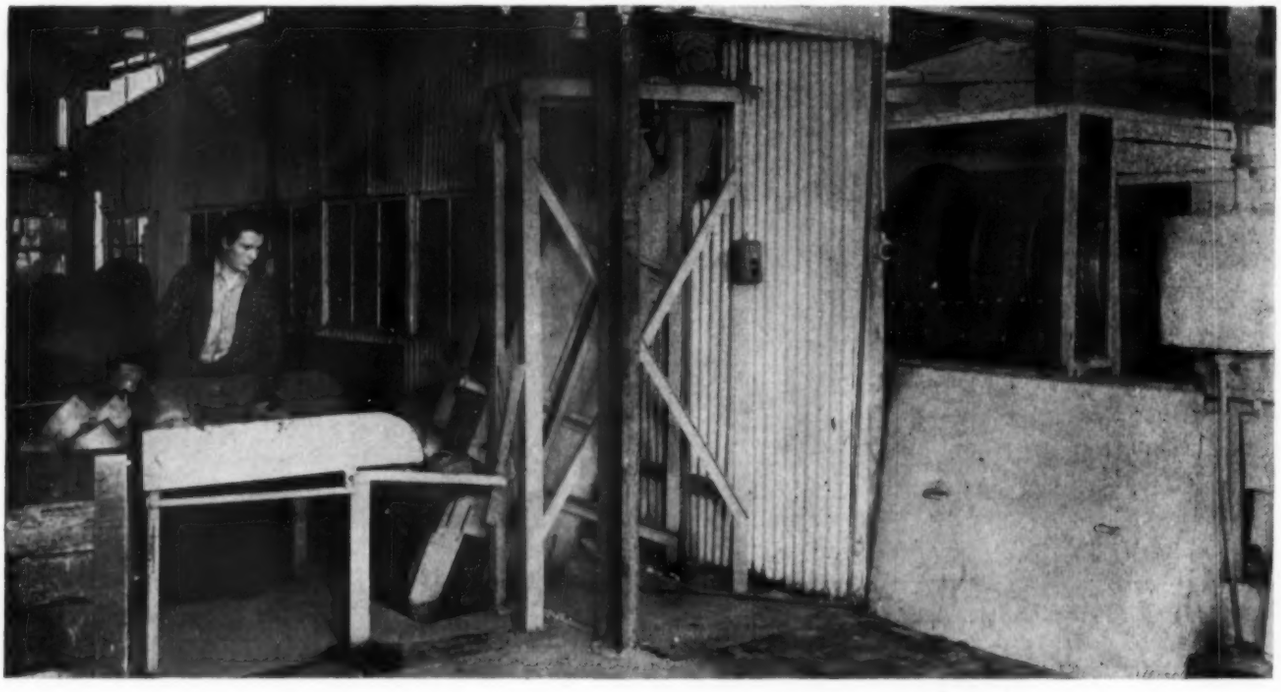




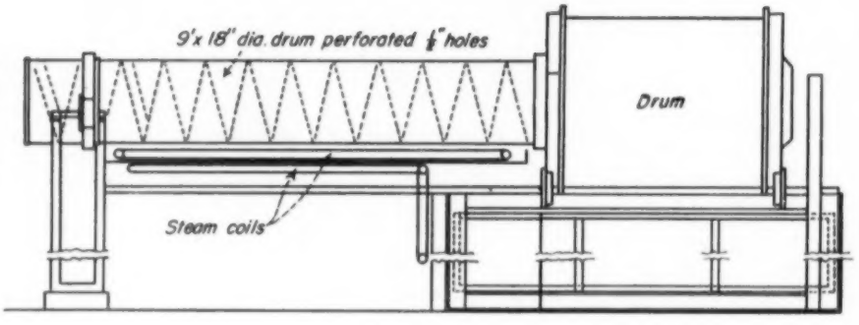
Compound Coater . . . Latest coating method is a wire-mesh conveyor passing through a spray cabinet. Conventional heavy-duty spray guns apply the coating, a grease-pigment mixture, from a sump in which it is kept agitated by nine 6-in. paddles, three to a shaft, chain-driven from a reducing gear. Extra compound returns to the sump through a filter screen, and further filters are incorporated in the intake to spray guns. The sketch shows principle only



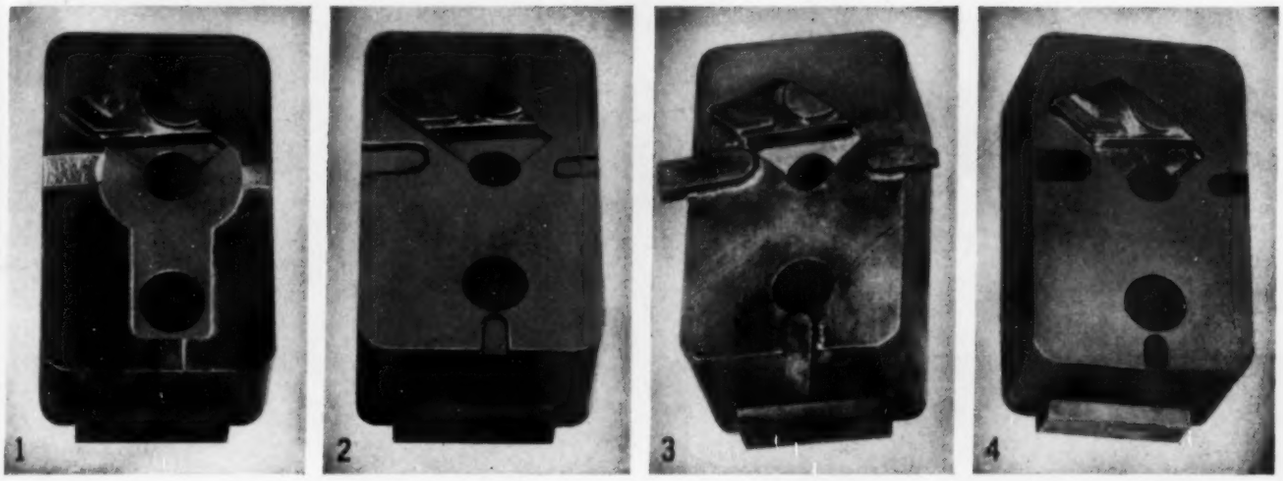
Pickling Drum... To make sure pickling baths reach all areas of formed pieces, air pockets are eliminated by rotating parts in the bath in a wire-mesh drum. The drum is on horizontal pivots, has a side door, in some cases is stainless steel 316 to withstand a pickling mixture of 10 parts nitric acid, 2 parts hydrofluoric. The drum is rotated by a gear train ending in shafts with a wormwheel at one end and a handwheel at the other, held in the support frame above the drum. With the handwheel, the drum can be placed and held in loading position; when it enters the pickling bath, the wormwheel meshes with a worm on the side of the tank. As many as three drums can be driven thus side by side in the same tank. A castered wooden carrier supports the drum for loading



Mixer Applies Compound... To apply drawing compound to parts in process, a rebuilt cement mixer is used. Parts are fed in one end after cleaning, are coated in the rotating drum by the oil-paraffin mixture, pass out the other end



STEPS IN REPAIRING MOLD



Original condition of mold showing severe abrasion at gate and vents

Worn areas are end milled out to receive standard carbide tool blanks

Carbide blanks inserted in cavities and brazed in place during hardening

Finished mold after carbide blocks have been ground flush on edges and face

Carbide Inserts Rejuvenate Plastic Transfer Molds

Wear at gates and vents of transfer molds for thermosetting plastics can be minimized by the use of carbide blocks inserted at all critical points

BY A. L. PRANSES,
Metallurgical Engineer
Materials Engineering Department
WESTINGHOUSE ELECTRIC CORP.

CONSTRICTED openings at gates and vents of transfer-type molds for thermosetting plastics are required to keep the fin on the molded piece as thin as possible, therefore easily removable. However, the abrasive molding mixtures used are introduced into the mold cavity under high pressure, and the speed of flow is greatest at the constriction, resulting in maximum wear through erosion of the steel at these points. The actual openings or channels are usually in one half of the mold, the other half having a flat surface. Most of the wear occurs on the flat area. This is particularly objectionable because, unlike the channels, it is a molding surface.

Similar but less-severe conditions prevail in the case of injection molds for thermoplastic materials, because the molding mixtures are generally less abrasive.

Accompanying illustrations show how tungsten-carbide inserts have been applied to a worn SAE 3335 steel transfer mold used by Westinghouse to make Moldarta plastic handles for electrical apparatus. In this case, repair by resinking would have been costly and the relief only temporary.

First step was to anneal the hardened-steel dies. Next, slots were milled at each of the three critical points, and standard tungsten-carbide blanks were ground to fit snugly into the slots. Using a protective atmosphere furnace and a solder containing 50% silver and 50% copper, the inserts were brazed into place and the die simultaneously hardened. The inserts, shaped to extend beyond the edges and above the surface of the die, were finally ground flush and polished.

Although this was a repair operation, the dies in question have given 8 months of service without perceptible wear, and carbide inserts at critical wear points are now contemplated for new molds of the transfer type.

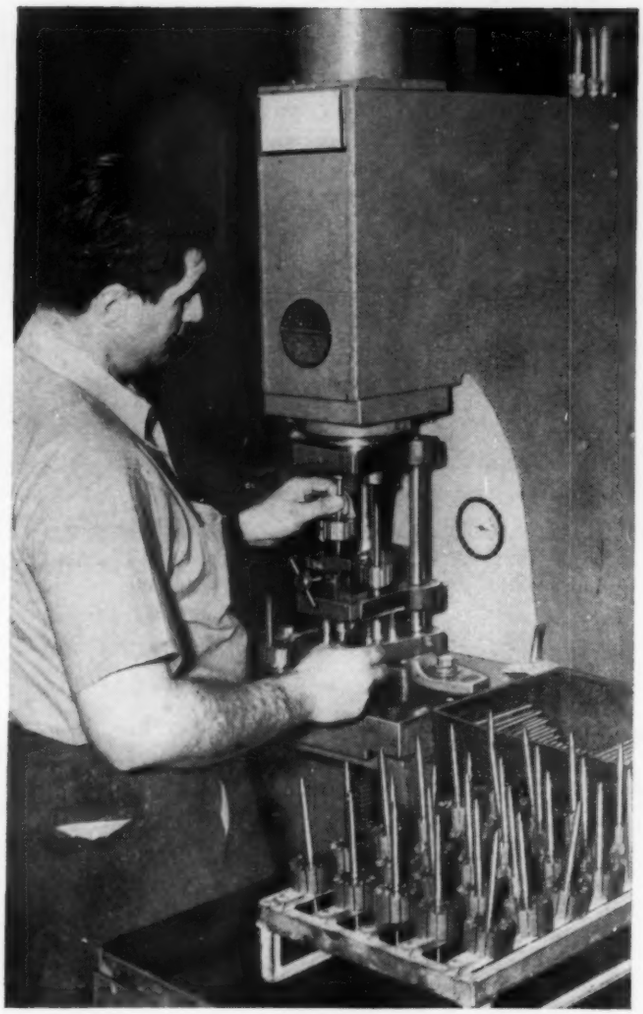
Other Applications

Study of all plastic molds on the design board has suggested the use of carbide for sprue assemblies, molding pins, and other parts where heavy wear is anticipated and impact conditions will not exist. The results have been gratifying, and the additional initial cost has paid off in increased die life, fewer shutdowns, and reduced finishing costs for molded pieces.

SHOP SHOTS

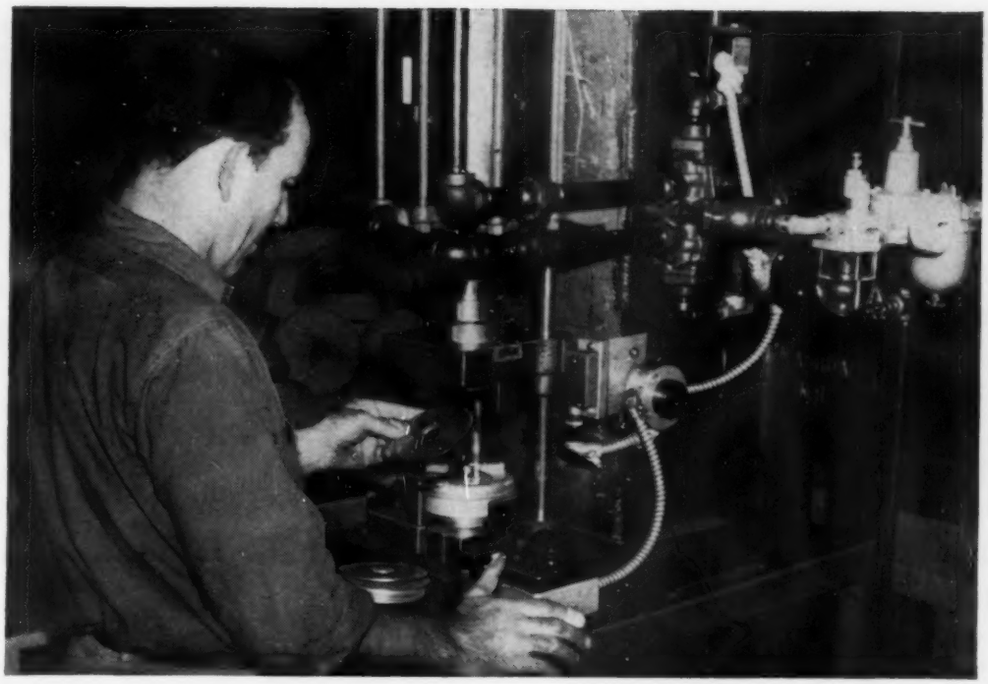
at Electrolux

Rotor commutators are turned with diamond tool in converted Logan lathe. Rotor is supported on shaft journals in bearing saddles and is belt driven while centers are loaded with air cylinder at 6- to 8-lb. pressure during machining. Rotors next are dynamically balanced to within 2 oz.-in. in Dynetric balancing machines

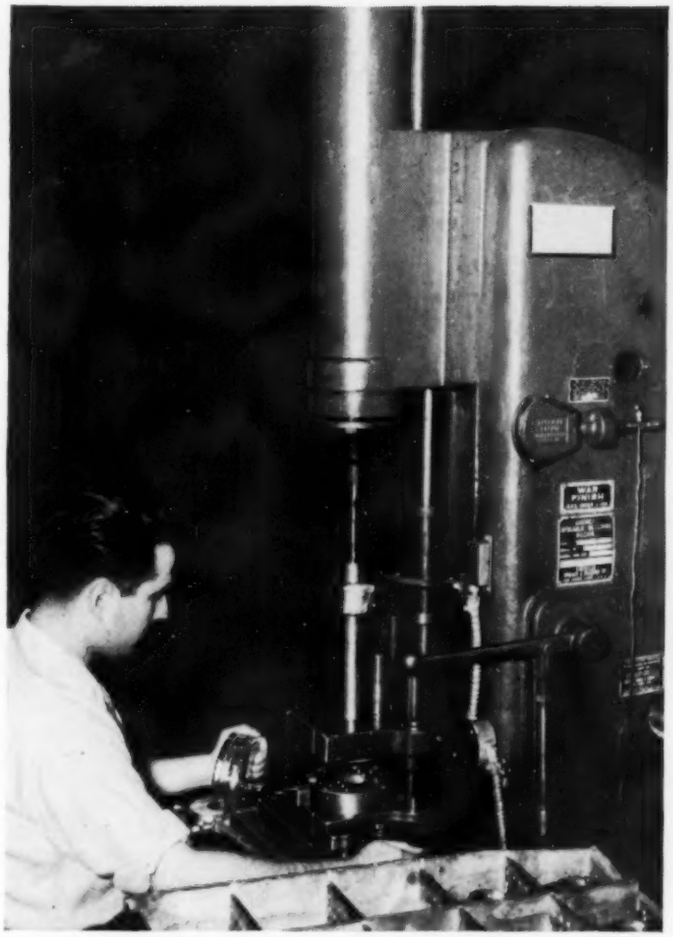


Armature laminations for vacuum-cleaner motors are assembled on shafts in 20-ton Northern hydraulic press with spring-loaded, two-position fixture. Two assemblies are completed each stroke of the press for production of 2,100 in an 8-hr. shift. Fixture is assembled from standard Danly die shoes and long guide pins, the center shoe being spring-supported. At bottom of press stroke, laminations are squeezed together under 15-ton pressure

Toggle-type bench fixtures are used for assembling blades to fan disks. Bottom disk is located on fixture plate by center pin, and six blades are set vertically so ears on blades enter slots punched in disk. Top disk is then placed over ears on other side of blades, and toggle-operated plate moved quickly down on top disk assembly so it will hold together until ears are staked in nearby press

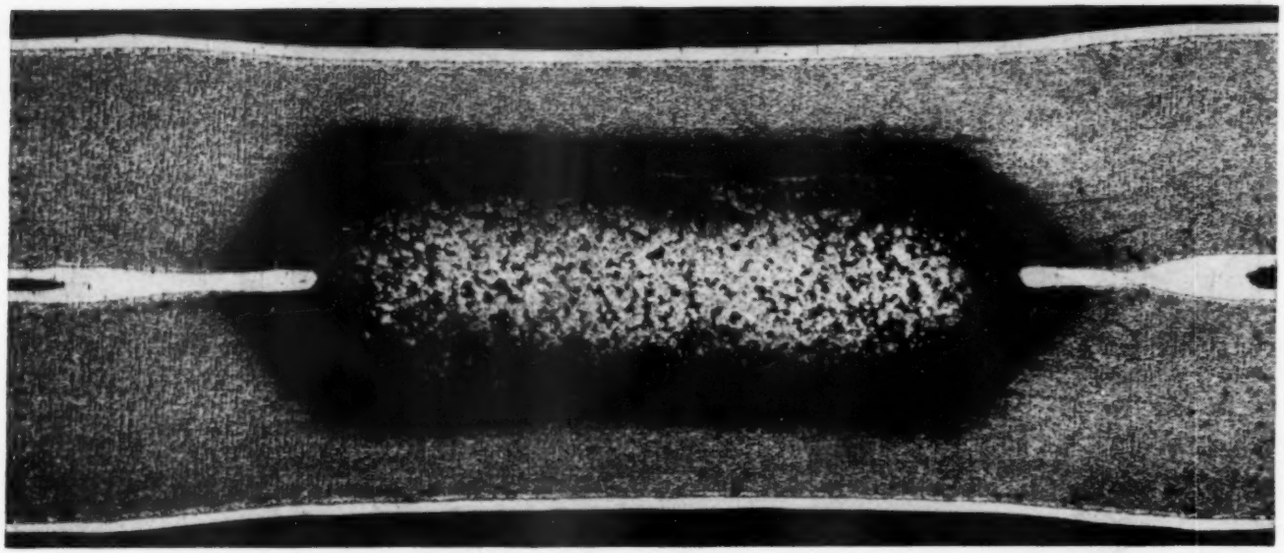


Air guides and cover disk are assembled and staked on fan housing in special air press built by Electrolux. Fixture consists of Danly die set with extended guide pins and special locating blocks. Shop airline pressure (90 psi.) is reduced to 40 psi. by regulator to obtain proper staking pressure applied by 8-in. dia. vertical air cylinder, which is controlled by solenoid valve operated by two pushbuttons for safety

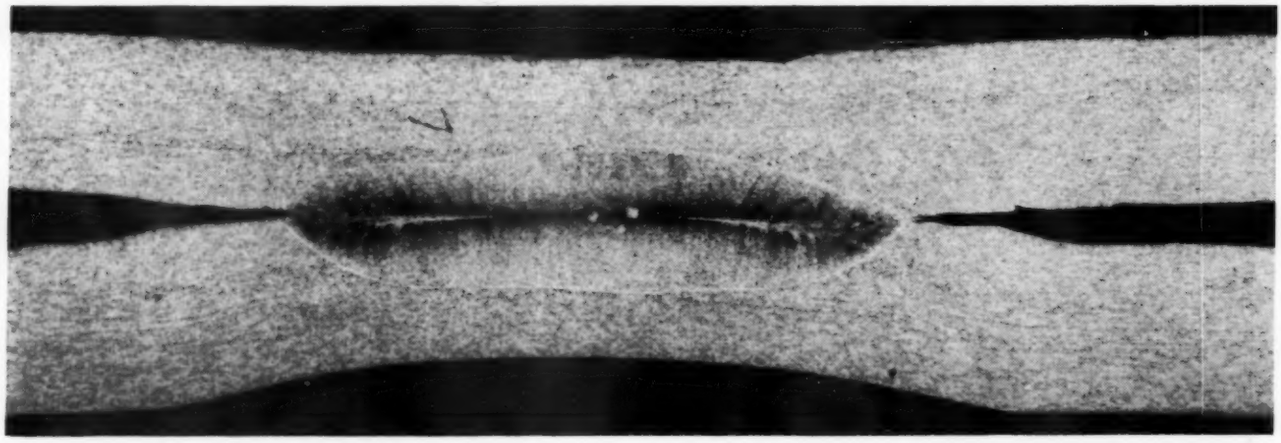


Clinching and staking blade ears in fan assemblies is done in a converted American 4-ton vertical broaching press at rate of 7,000 fans each 8-hr. Fixture has spring-loaded pressure pins which are compressed as the ram moves down against the work. Slide pins in front of fixture locates fan assembly above these pressure pins

Sheet-aluminum fans are assembled to hubs with Grant No. 303 rivet spinner. Floor pedal controls movement of 2400-rpm. spindle to bring spinning head against hub when fixture is moved to align hub with tool. Parts are positioned on hinged swinging fixture while withdrawn from working position



Aluminum alloy spot-welds should look like this ↑



. . . but sometimes they look like this ↑

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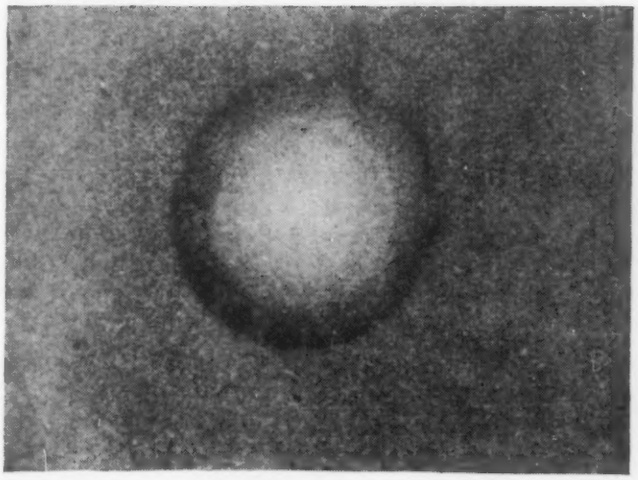
DEFECTS IN ALUMINUM ALLOY SPOT-WELDS

BY C. R. DIXON, WELDING SECTION, JOBBING DIVISION, ALUMINUM CO. OF AMERICA

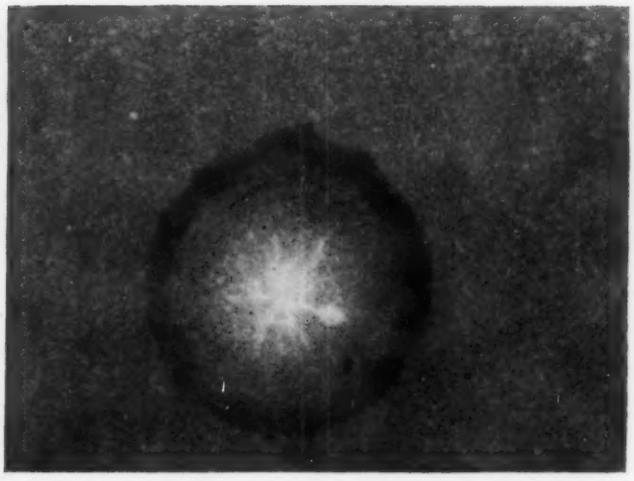
SOUND spot-welds in aluminum alloys are produced, provided the conditions are correct for that particular alloy. Welding current, electrode force, and electrode contour are more critical for high-strength aluminum alloys than for those of low strength.

The micrographic section at the top of this page shows a sound spot-weld in Alclad 24S-T4(T) alloy. In the micrograph below this there has been excessive sheet separation and electrode indentation in two pieces of 0.064-in. 3S-H14(1/2H) alloy. Distortion such as this may occur at the weld with buckling throughout the part because of high electrode force with a too sharply contoured electrode. This may occur with good penetration as happened in the case illustrated here.

Actually the spot-welding is not

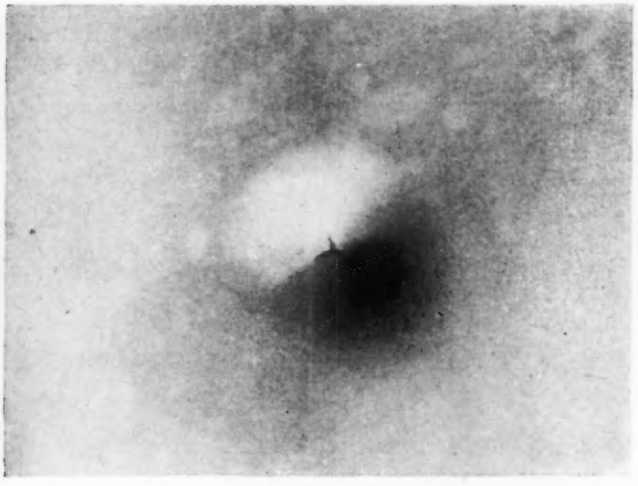


Sound spot-weld shown by a radiograph. This is Alclad 24S-T4(T) alloy. A radiograph is an X-ray picture. When a print is made from the negative, voids, cracks and holes appear as light areas because they permit readier passage of the X-rays through the work to the film. Radiographs of spot-welds in aluminum are usually made on equipment in the range from 3,000 to 50,000 volts



Internal cracks are sometimes encountered in high-strength alloys, such as this spot-weld of two pieces of 0.064-in. Alclad 24S-T4(T). Low electrode force or excessive welding current may cause such cracks. When these cracks are large, they may be observed in the weld by twisting the two pieces of sheet to shear the weld nugget between inner surfaces. The only non-destructive method of discovering small cracks is with X-ray

Expulsion occurred in this weld of Alclad 24S-T4(T) alloy. (Internal cracks can also be observed.) Molten metal is confined laterally by an unmelted ring of parent metal under pressure. If any part of the ring gives way, expulsion occurs. It is caused by high electrical resistance between the inner surfaces, inadequate electrode force, insufficient edge distance to the spot center, or a poor fit of the parts being welded



External cracks usually occur on the high-strength aluminum alloys only. This weld is in two pieces of 0.081 in. 24S-T4(T) alloy. As with internal cracks, the cause may be low electrode force or excessive welding current. External cracks weaken the weld nugget. This defect is naturally easy to discover. This picture is an external photograph, rather than a radiograph as are all the other pictures on this page

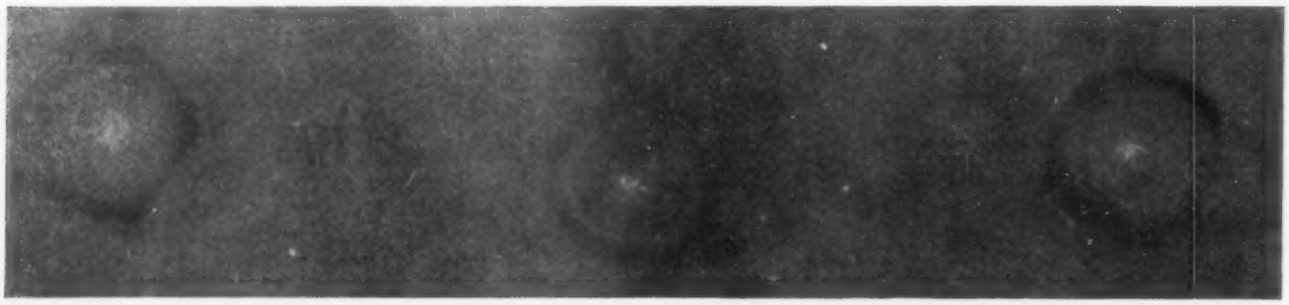
as complicated as it seems to many, and investigation should erase many of the fears that exist.

Fundamentally, a spot-weld is made by applying electrodes under pressure to the two pieces being welded and passing sufficient current through the metal to obtain fusion between the contact or faying surfaces.

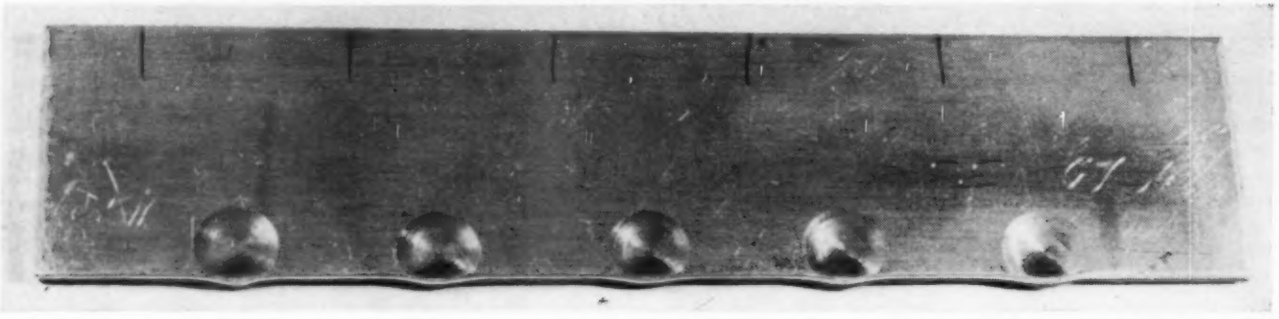
We are concerned here with spot-weld defects, the conditions causing such defects, and the methods of correcting them. No consideration has been given to the analysis of welding-machine circuits, pre-cleaning of material, strength and performance of the welds. Ample information is available on such subjects in magazine articles, books, and manufacturers' literature.

On these pages are shown, in addition to a few sound welds, examples of the most common defects occurring in spot-welds in aluminum alloys. Such defects may vary in degree from these examples. However, these pictures should aid you in recognizing conditions that may be encountered and assist you in correcting the faults.

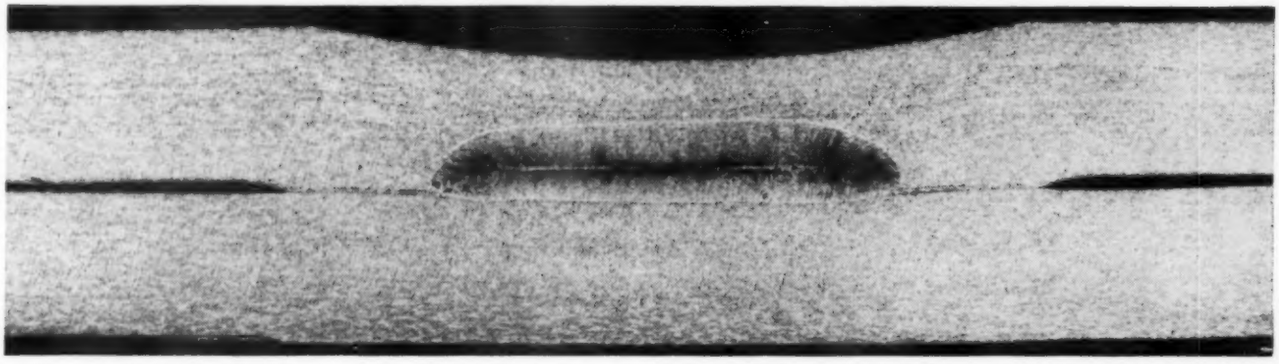
(NEXT PAGE PLEASE)



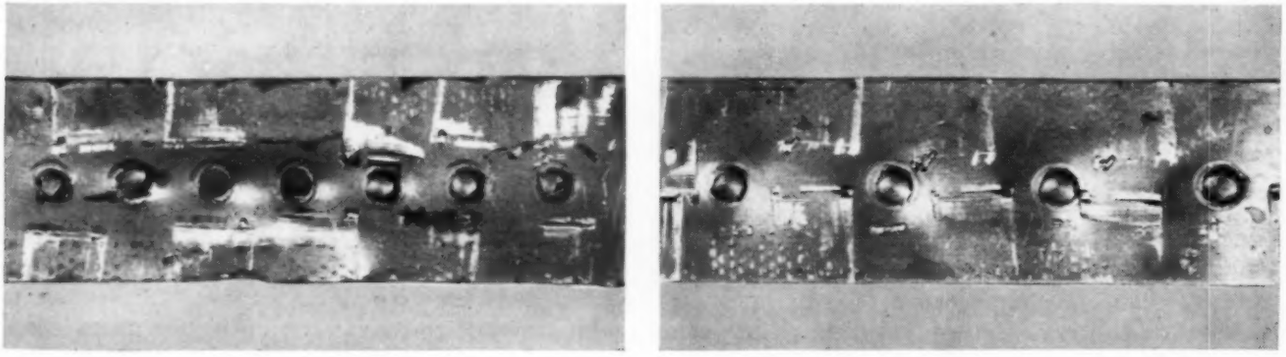
Unsymmetrical welds are caused by using welding electrodes of improper shape, unsuitable hardness, or insufficient electrical conductivity. This is an exograph of welds in two pieces of 0.040-in. Alclad 24S-T4(T) alloy. Electrode contours can be maintained by dressing with emery cloth over a tool of proper radius. Unsymmetrical welds may be sound, but they lack the strength and consistency of symmetrical welds



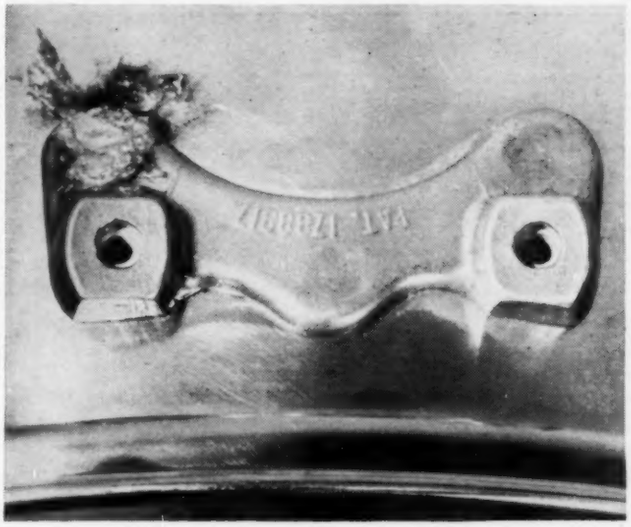
Insufficient edge distance in a soft alloy is shown here. This is two pieces of 0.064 in. 3S-H14(1/2H) alloy. In a high-strength alloy such welds would result in expulsion and loss of strength. It is desirable to maintain a distance from the edge to the weld center of about six times the thickness of the thinner part



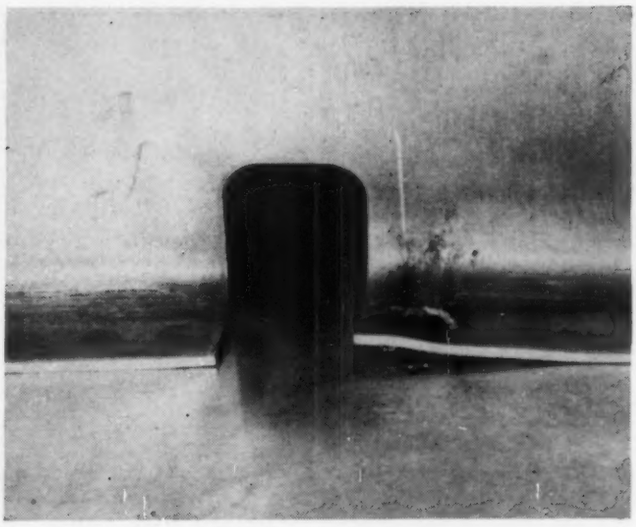
Uneven distribution of the fused zone in two pieces of 0.064-in. 3S-H14(1/2H) alloy. For proper weld strength the fused zone must be at least nearly evenly distributed between the parts. Where pieces are of equal thickness and electrical conductivity, the electrodes should have like contours. In other cases, combinations of electrodes which result in good penetration into both parts should be selected



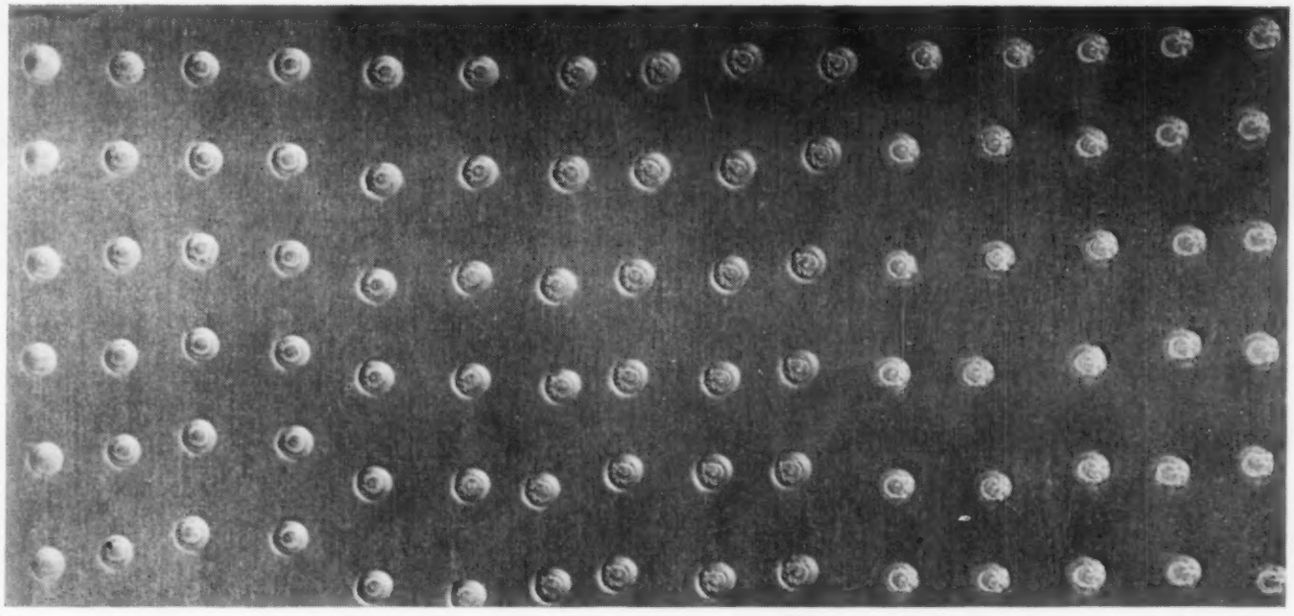
Close spacing (at the left) and correct spacing of welds each in two pieces of 0.064-in. Alclad 24S-T4(T) alloy. Machine settings were similar in each case. The marks on the sheet were made by the chisel which broke the welds. The first point of electrode contact carries 100% of the weld current. On subsequent welds part of the current is shunted through preceding welds. This must be compensated for by increasing the weld current or minimized by correct spot spacing. Spacing should be about 16 times the thickness of the thinner sheet



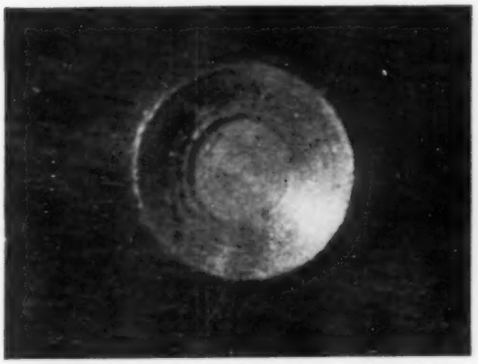
Blown spots result from failure to establish a pressure ring to confine the molten metal. One cause is a machine fault where electrode power has not been applied prior to passing welding current or where current continues to flow after electrode force is removed. This blown spot on a cooking-utensil bracket resulted from the latter



Poor fit of the parts, as in this tank wall and baffle, is another cause of blown spots. A large part of the electrode force is needed to overcome the deformation, leaving practically no actual welding force. A small piece of sawdust, paper, paint, or any non-conducting substance between parts may also cause a blown spot



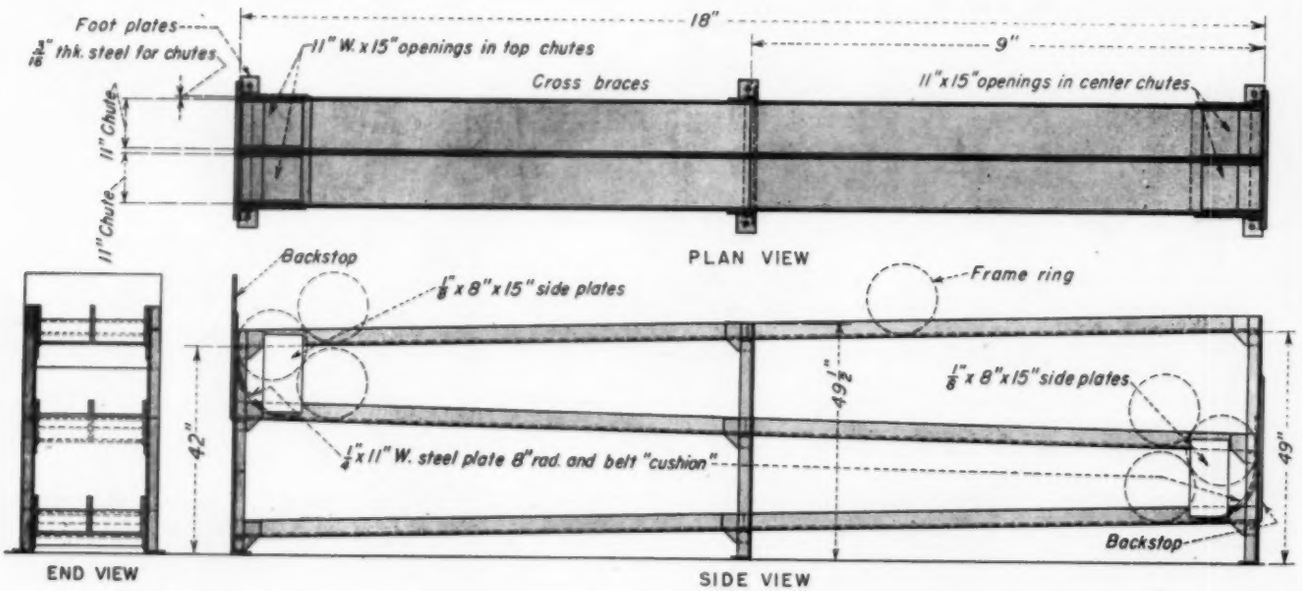
Pick-up is the term applied when deposits from the electrode may be seen on the metal at the point of contact or when particles of metal adhere to the electrode. It is caused by high electrical resistance between electrode and part and becomes progressively worse. On the panel above, welds were started at upper left and proceeded down and up across the panel. Both kinds of pick-up can be seen—blackened areas are electrode deposits, and rough areas are caused by removal of metal. Pick-up is eliminated by periodically cleaning welding electrodes. Maximum number of welds between tip-cleaning operations are obtained by correcting the factors which cause early electrode contamination. These include poor electrode cooling, incorrect machine settings, high surface resistance of work, incorrect tip contour, or foreign material on the contact surface



When all conditions are right, this is the result. This sound weld is in 3S-H14(1/2H)

Storage of 130 motor frames in this chute rack provides continuous operation of the seam welder while rolling machine is producing other sizes. Pneumatic lift table has just delivered two rings to stand alongside the welder and is returning to lower position where it will automatically load two more frames ready for delivery

Compact Chute Rack Stores Motor Frames



Frames up to 14½-in. O.D. and up to 10 in. long are handled in this size rack. Welded-steel construction is employed. Curved steel plates faced with old conveyor belting cushion the drop from flight to flight

Racks provide both compact storage and automatic delivery of frame rings to welders at Westinghouse motor plant

BY J. F. MILLER
Manufacturing Engineer, Buffalo Divisions, WESTINGHOUSE ELECTRIC CORP.

DELIVERY of rolled-steel frame rings for Life-Line ac. induction motors to submerged-arc seam-welding machines has been simplified by installing at each welding machine a chute storage rack and pneumatic lift table. When the rack is filled, frame rings roll to the delivery end of the rack without further attention from rack loaders or welding-machine operators.

Frames for Life-Line induction motors made in standard NEMA frame sizes No. 203 to No. 326 are cold-rolled into circles on a Kane & Roach through-roll rolling machine. They are made from ⅜- to ½-in. mild steel plate, 9 to 12 in. wide. Rolled frames are delivered from the rolling machine onto a V-roller conveyor. Set at right angles with this conveyor is a chute rack leading to each of the seam-welding machines. Rack loaders, working along the roller conveyor, transfer these rings into the proper chutes.

Keep Welders Busy

By providing extra storage area in the chute racks, each welding machine can be kept supplied with frame rings while the rolling machine is producing frame rings of other sizes. When it is considered that each seam welder can produce approximately 220 NEMA frame No. 254 motor frames or 250 NEMA frame No. 204 frames per day, need for this extra storage capacity is easily recognized.

Chute racks for the individual seam-welding machines are designed to handle frames of the sizes usually welded on these machines. Each is made of 3/16-in. steel with 3-in. deep side flanges. Two individual chute sections are set side by side in each rack flight, three such double flights making up each rack assembly. The flights are supported by welded steel frames assembled principally from ¼x2½x2½-in. rolled steel angles and ¼x6x6-in. steel gusset plates. Each rack is 18 ft. long, and 49 in. high at the loading end.

Fall is Cushioned

Details of the construction of the rack designed for NEMA No. 203 to No. 284 frames are shown in accompanying sketches. For this rack, the top chute flight has a pitch of 7 in. in 18 ft., the second flight drops 6 in. in 18 ft. and the bottom flight drops 8 in. in 18 ft. An 11-in. wide and 15-in. long opening is cut in the lower end of each of the two chutes in the top and middle flights so frames drop progressively from the top flight to the bottom flight. To absorb the force of the dropping frames, moving from an upper to a lower flight, a ¼-in. thick steel plate bent to an 8-in. radius is fitted in the upper end of each chute in the center and lower flights. Each of these curved sheets is lined with a cushion made from discarded conveyor belts, further to absorb forces imposed by dropping frame rings.

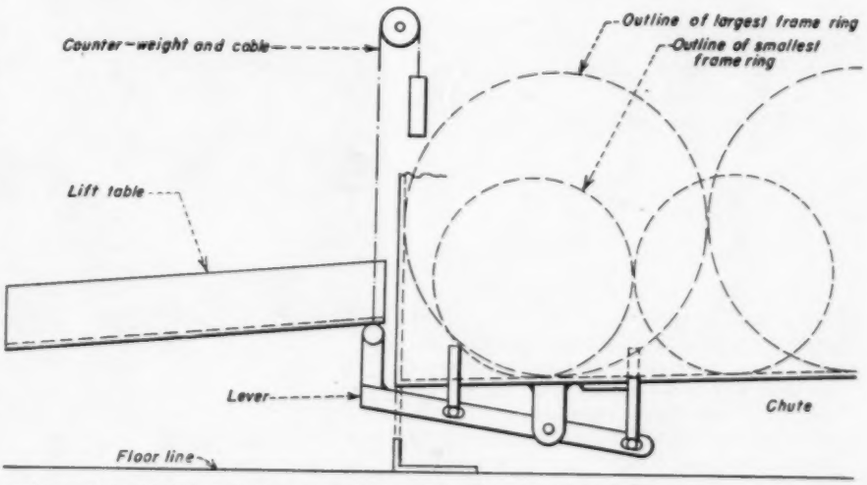
At the discharge end of each chute rack is an air-lift device whose table, when in its lower position, forms a continuation of the bottom chutes of the rack. When raised to the upper position, this table discharges frame rings, two at a time, to a table beside the seam-welding machine. Both table assemblies are of welded-steel construction.

Legs of the rack, the air lift and the table are mounted on ¼x4x4-in. steel foot plates drilled for lag screws so all three units can be bolted to the floor. Automatic stop plates built into the discharge end of the lower chute in the rack control delivery of rings from the rack to the lift table.

Operator Controls Delivery

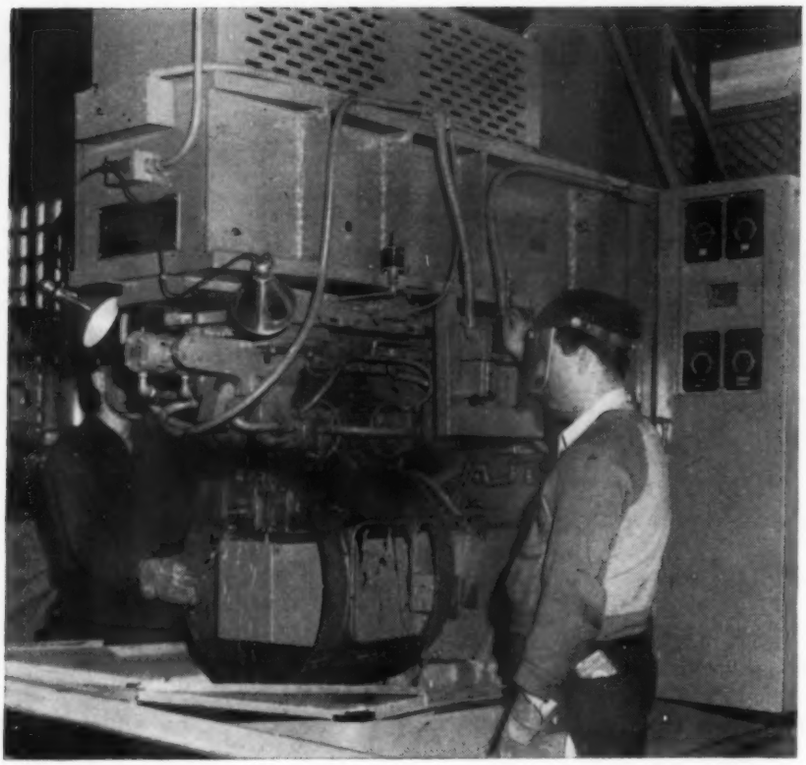
In its lower position the lift table depresses an operating rod which lowers the outer stop plate and raises an inner stop plate so only one frame ring can be discharged to the lift table from each chute section in the rack. When the table is raised to deliver these two rings to the welder table, the operating rod is raised by counterweights to lower the inner stop plate and raise the outer stop plate, thus permitting rings in the rack chutes to move forward one diameter, ready for the next cycle. Actuation of the lift is controlled by a pedal valve under the welder table, as shown in the photograph.

In this way the operator can deliver frame rings to the welder table at any desired rate.



Stop plates in the bottom of each chute are operated by lift table. Plates are carried on pins welded to a 1-in. rod which extends across face of rack. As table descends and pushes rod down, front stop plate is lowered and rear plate is raised, permitting one pair of rings to roll onto lift table. As table rises, stop plates return to former position and all rings in the rack advance one position down the rack flights by gravity

Improved Materials Handling Means More Washing Machines

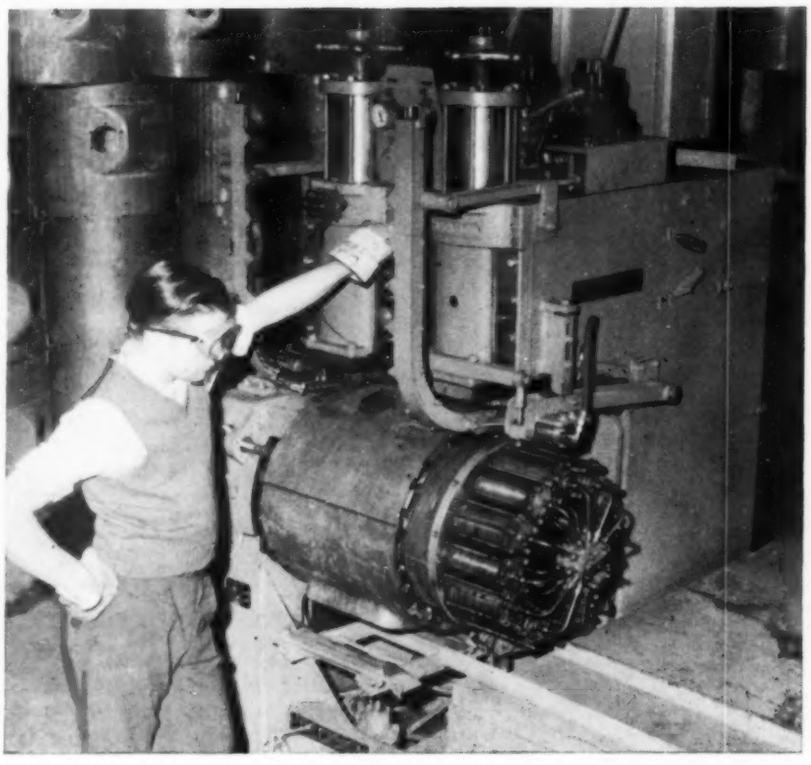


BY B. V. EASTMAN
ASS'T. GEN. MGR., INDIANAPOLIS DIV.
F. L. JACOBS CO.

MATERIALS HANDLING has been given special attention in designing the layout for manufacturing the Launderall automatic home laundry in the Indianapolis plant of F. L. Jacobs Co. Maximum production in minimum space has been aided by the installation of nearly 1¼ miles of conveyors of various types. Storage space is reduced by scheduling materials from outside vendors on a weekly basis, and by maintaining operating banks at the lowest practicable level.

Very close controls are exercised over painting and Bonderizing operations, and Bonderite solutions are tested hourly to guard against contamination. In addition, tanks are cleaned thoroughly at approximately two-week intervals. Paint

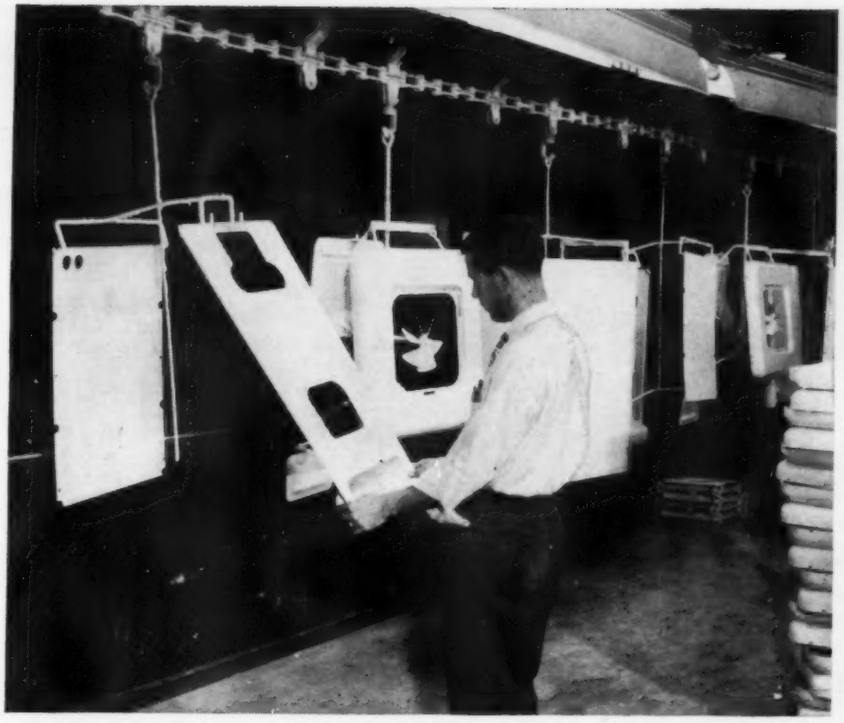
1 **Top and bottom** halves of the tub are seam welded on a specially designed machine. Both halves are located in a magnetic fixture which holds them in the correct position for welding. Twin-wheel electrodes each cover half the seam length to shorten welding time. Electrode travel and pressure are powered hydraulically and entire cycle is electronically controlled



2 **Tub ends** are trimmed square on a special double-end machine, and 12 mounting brackets are welded to each end in a specially designed resistance welder. Tub is mounted on an expansion arbor having 24 electrodes in parallel, and rotated by a geneva movement to give index and dwell. Brackets are fed from a magazine, and positioned and held by electronically controlled air clamps. Arbor is expanded by 12 air cylinders, manually controlled, and welding heads are powered by electronically controlled air cylinders. Fully automatic welding cycle takes 22 sec.

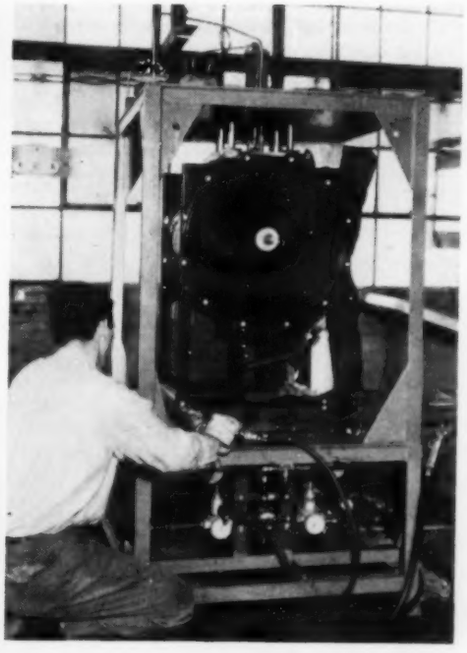
supply is through a DeVilbiss eight-tank circulating system, each tank holding 75 gal. Spray booths are fed from a pumping station immediately adjacent to the paint-mixing room. Paint baking is done in gas fired infra-red ray ovens, the prime coat being baked in a 60-ft. oven for 10 min. at 375 F., and the finish coat in a 50-ft. oven for 15 min. at 320 F. The continuous conveyor in the oven is set at the correct speed to accomplish the required baking time. Hourly records of the Bonderite test, records of paint temperature and viscosity, batch number and vendor, and records of baking schedules are retained for a year for comparison and check if required.

The clothes cylinder is made from aluminum and is fabricated by welding. It is supported inside the tub by a shaft at each end set into bearing assemblies mounted in the main support members. The tub and main support members are porcelain enameled for maximum resistance to rust.



3 **Monorail conveyors** equipped with special hooks carry stamped panels from the presses through the welding line and into cleaning, Bonderizing and paint departments. After baking on a continuous conveyor in an infra-red ray gas fired oven, parts are conveyed through paint inspection and to the assembly and subassembly lines

4 **Subassembly** of bearing and main support member. These and other parts and subassemblies, together with the wood base for the shipping crate are hung on a conveyor with special hooks to suit the individual parts. Hooks are spaced to accommodate the final assembly sequence. Major subassemblies, including control panel, tub assembly, aluminum cylinder assembly and top door and cover assembly are conveyed from their stations to the main assembly line



5 **Pneumatic leveling** fixture installed in the main assembly slat conveyor insures the top of the tub being at 90° to the main support members before the cross member and tub bolts are tightened. Final assembly of motor, transmission, controls, and top and side panels is done on an adjustable speed pallet type conveyor. Maximum speed gives a production of one complete machine in 48 sec.

(Next page please)

6 **Assembled machines** are shunted from pallet conveyor to merry-go-round test racks for complete operating test. Rack accommodates 15 machines with running water stations, and power and light are supplied from overhead trolley duct. Test includes a full washing cycle with 10 lb. of clothes, but as it is for operation, not washability, cold water is used. Accepted machines are switched to a roller conveyor for attachment of hoses and rear panels, and for final inspection, paint touch-up and crating

7 **Crating operations** are simplified by performing final assembly on the base of the shipping crate. A slatted corrugated tube is lowered over the machine, the top cover put into place, and top and base are nailed to the tube. Crated washers are removed from the conveyor by a hoist and stacked two high

8 **Two sets of forks** are used on electric lift trucks to lift machines two at a time. Trucks are highly maneuverable and can work inside box cars or semi-trailers. All loading operations are done under cover

5,000,000 Youngsters Need Our Help Now

THE bumper wartime crop of babies, about 5,000,000 larger than the population experts expected, is reaching school age.

At school these youngsters should find a good education awaiting them. That is their most cherished American birthright.

But unless something is done quickly, millions of these children will be cheated. They will crowd into classrooms already run on double shifts. They will move in with children who are now sitting two in a single seat. They will read germ-loaded books mangled by a generation of use by grimy hands.

I

So the continuing crisis in American education is given a new twist by unexpected pressure on school plant and equipment.

The U. S. birthrate has jumped by leaps and bounds. Instead of declining in the '40s, as the experts expected it would, the rate climbed from 17.9 per thousand in 1940 to 21.5 in 1943. It jumped to 25.9 in 1947, an increase of 45 percent since 1940. Result—by 1956 elementary school attendance in the United States is expected to jump from 18,200,000 to more than 23,400,000, an increase of about 5,200,000, or more than one-fourth.

The rush has already begun. It will pick up speed next fall.

Now, while this pressure has been building up, our public schools and their equipment have been running down—first through inevitable wartime neglect, then because inflation and material and labor shortages made it difficult to catch up.

If we are to give this bumper crop of youngsters the break they deserve—and reach the educational standards the nation needs—we must speedily do a major job of educational rehabilitation and expansion.

II

Some headway has been made in overcoming the teachers' salary crisis.

Teachers' salaries are improving. Pay problems were driving good teachers away from their posts in droves not long ago. But in the year since the 57th editorial in this series emphasized that crisis, the average teacher's annual salary has increased about $300—from $2250 to $2550.

True, increases vary enormously from state to state and from town to town. In a few states the average increase has been $500; in some less than $100. But, for the nation as a whole, last year's increase put teachers about even in the race with the cost of living. After taxes, their salaries have risen 68%, and the cost of living 67%, since 1939. In terms of pay increases, however, they are not nearly as well off as are industrial workers, whose average weekly wages after taxes have risen 108% since 1939. They are far behind farmers, whose net income is now four times what it was in 1939. And teachers had notoriously low salaries to start with.

A great deal more needs to be done in raising salary standards to put our school system on a firm footing. There are still about 100,000 teachers, nearly 12% of all public school teachers, who hold temporary or emergency credentials. They cannot meet

prevailing standards, and not very severe standards at that, for persons holding their posts.

The salary crisis, however, is easing.

III

But now comes the new crisis in school buildings and equipment.

We would have been hard put to get our schools back into shape after years of wartime neglect—even without a booming birthrate complicating the problem. Right now, 85% of all public school buildings need major remodeling to remove health and safety hazards.

And we aren't building enough new schools to keep up with current needs, to say nothing of catching up on those we were not able to build during the war years. School construction expenditures for 1948 are estimated at $375 million – which is less than what was spent in 1939. With building costs twice as high as they were in 1939, that means we aren't even holding our own—we are falling further behind.

And now comes the rush of war babies.

IV

We must spend at least $11 billion on new schools and equipment in the next decade.

Public and elementary schools must have $6.6 billion. Equally important, another $4.4 billion must be invested in buildings and equipment in our private schools, colleges and universities if they are to meet the demands which will be made upon them. The private school and the privately endowed university are doing their full share and doing it well. The need for them is increasing.

These figures cover only rockbottom needs for educational plant and equipment. But statistics are a very restricted recorder of this crisis.

You can see it better, I'm sure, in schools not very far from your home. There are schools with leaking roofs and outdoor toilets in our greatest cities. There are schools where students still use histories and geographies copyrighted before 1920—books with no mention of World War I, the depression of the 1930's, the Russian Revolution or the rise of the dictators. There are countless schools where modern methods of visual education are completely unknown.

All of these conditions promise to get worse – promptly – as that scheduled 5 million increase in the school population gets rolling.

V

The Metropolitan Life Insurance Company does not indulge in lurid prose. It says after painstaking study of the educational crisis that:

"Unless definite measures are taken immediately . . . large numbers of American boys and girls will be deprived of an adequate education."

Currently we are deeply concerned about our military defenses. We are taking, and I think rightly, emergency measures to strengthen them. But we must regard our schools as a part of our national defense as vital as are our armed forces. This is particularly true in these times of fifth columns and ideological warfare.

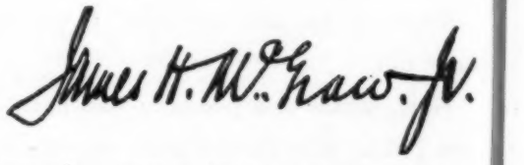
If we are wise, we will raise our sights. We will give the continuing crisis in education the same urgent attention being given the more obvious but no more real crisis in national defense.

Go to the school house in your neighborhood and discover what needs to be done to provide for the rising tide of young Americans. Ask your school board and your school administrators and teachers how you can help them.

That is good citizenship.

That is patriotism.

That is our duty to the oncoming generation.



President, McGraw-Hill Publishing Company, Inc.

THIS IS THE 68TH OF THE SERIES

EYES ARE YOUR MOST VALUABLE MACHINES

Eyes bring 83% of knowledge, control 80% of activities. So, what can be done when . . .

A crane operator is blinded by arc welding?
A stockroom clerk can't see the upper bins?
New lighting cuts production?

The answers to these questions show that there is more to visual engineering than just a good pair of safety glasses

BY L. J. MASTACHE
INDUSTRIAL VISION SERVICE

THE TREND toward finer and smaller detail in both machines and products has been accompanied by no comparable evolution of workers' eyes—there has been no development to help workers do this finer work with less effort and fatigue. In addition, living in this world of finer detail, their lives tend to become more centered about close objects. There is less hunting and fishing, more reading and sewing; less outdoor recreation, more kitchen-table hobbies. Yet essentially the human eye is still an instrument for distance seeing. Close work is done only with the expenditure of much energy and consumption of reserves.

While industry has developed better machinery, modified old processes, and developed new ones, working to ever closer tolerances, it has done little for the machine that supervises and controls these processes—the worker's eyes.

The few studies that have been conducted to determine the condition of workers' eyes, have revealed astonishing conditions: Of a group of 500 drillpress operators, 80% were visually inefficient. Of 540 foundry workers, 60% were visually inefficient. Of 11,000 men making railroad cars, 58% were visually inefficient. Of 9115 steel workers, 31% were visually inefficient.

In these cases, 31 to 80% of the visual machines were not up to normal standards. Yet most of these could, with simple ophthalmic devices, be brought to the normal standards of efficiency and productivity. It is amazing that industry, so quick to plug nickel and dime leaks, permits payroll dollars to be lost through visual inefficiency.

Most of these men were deficient by normal standards, not by those for their specific jobs. Yet the "standard" is only being able to see a movie and read a newspaper at 14 in.!

A study of 700 employees in a metal-stamping department showed a 37.5% saving on wastage after correction of visual defects with glasses. In addition, 90% of the workers corrected showed an increase in productivity.

In another plant, 20% of assemblyworkers were provided with corrective glasses, the lighting system was improved, and a rest pause was introduced to lessen eye strain. Output increased 19.5%, and quality—based on reduction in rejects—increased 16.2%.

There are two aspects of management's concern with vision: conservation, and efficient utilization. A comprehensive program must naturally include both. Most plants are aware of the first problem and attempt to cope with it, but the second half of the program is usually ignored.

Conservation

Industry no longer needs to be told to protect against injury to the eyes of employees. Goggles are usually provided where needed. Even so, the inadequacy of our protection is seen when we realize that eye injuries occur in American industry today at the rate of 1000 a day. Compensation costs run to over $20 million yearly, but this cost is dwarfed by losses in the services of skilled workmen as the result of these injuries.

However, effective eye-safety programs have been carried out in many plants. Western Electric's plant in Kearny, N. J., issued 22,000 pairs of safety glasses. The

cost of the program over a two-year period was $53,000. In that same period, 24 pairs were shattered. An impact great enough to shatter the safety lenses would surely have cost an unprotected worker an eye. In addition many flying particles must have been deflected which could have caused serious injury, but were not heavy enough to shatter the glasses.

These 24 eyes would have cost the company $72,000 in compensation and related expenses—$14,000 more than the cost of the goggle program. When we consider that the company had, in addition, the continuous services of these trained employees, the saving becomes even more impressive.

Efficient Utilization

As a byproduct of goggle programs, some work has been done along the lines of aiding vision, studying its place in production, and enabling it to do its job more efficiently. Some of these attempts have been made by individuals lacking in the necessary knowledge of industrial-vision problems. What is required is men with knowledge of the eye and its function, of engineering, production methods, lighting and related problems.

Such a program should begin by locating the workers whose vision is below accepted standards, then bringing vision up to normal with lenses, prisms, visual training, or other means, wherever it is feasible.

The value of this part of the program is indicated by data from the U. S. Public Health Bureau on one million people: Of those in the 17- to 18-year age group, 20% have visual problems; by age 30 it is 39%, by age 50 it is 71%, and at 60 years it is 80%. In skilled occupations, the older men are more valuable. They are the supervisors, inspectors, and highly skilled machinists.

Yet while machinists who are 50 years old may have had 30 years of experience, 71% of them will be visually deficient. Fortunately, over 90% of these can be brought to normal standards by professional attention.

Effect of Lighting

Illuminating engineers are the first to recognize that good lighting is a supplement to good vision, not a replacement for it. An example of effective lighting installations is a pulley factory which spent an amount equivalent to 5% of its payroll on good lighting and increased production 37%. A heavy-steel machining plant at 1.2% of payroll cost increased production 10%. An electric iron manufacturer at 2.5% of payroll cost increased production 12%.

But what about the company that, at considerable costs, installs new lights, only to hear employees complain, "The new lights are ruining my eyes?" It usually means that the installation was set up by men not well versed in visual problems as applied to the operations of the plant.

One example is the relighting, with almost complete removal of shadows, of a work bench where girls inserted bright jewels into small bright plates. After the revision, production dropped greatly and the girls were unhappy—although they did not know what the trouble was. Examination by a visual expert showed that the girls, rather than look at the bright parts, were guiding the jewels into the holes by following the shadows. With relighting to provide shadows in the most convenient position, production climbed, not just to its former place, but much higher.

Case Histories

There are many other ways in which visual engineering can improve plant production. Their nature can best be indicated by a few case histories:

An overhead crane operator in a large shop often had to take his hand off his controls to shield his eyes from the glare of welders working in the bays below him. If his load was to be landed near the welders, they had to stop entirely. Dark goggles had been tried, but they limited his vision too much when he looked in other directions. The solution, which cost $6, was a pair of half goggles which gave him clear vision at normal times and glare protection when he needed it by a slight tilt of his head.

Several older machinists, valuable for their experience, were noticeably slowing down in production. Inspection revealed that they were wearing the proper bifocal lenses. Further study showed, however, that many of their tools and gages were set in racks above the machines. This made it necessary for them to tilt their heads back very far in order to see through the reading segment while making their selections from the racks. Putting these tools in trays which slipped under the machines restored production rates to normal.

Another common case is the stockroom clerk with bifocals who has trouble seeing listings above his chest. It is difficult and time-consuming to have to bend the head far back to read high listings through the lower segment. Whenever this problem is encountered, it is easily corrected by putting an

additional reading segment in the upper portion of the lenses. This does not interfere with normal vision but permits the clerk to see upper listings merely by lifting his eyes.

A welder who must wear bifocals finds it almost impossible to see through the "near" portion of his lenses and, at the same time, through the opening in his hood. Two lenses which correct the distant portion of the regular glasses for near vision take care of the difficulty. They are put in a plastic plate which is inserted in the hood behind the filter glass.

These examples have been only random indications of what is being done in the plants that are applying visual engineering.

No factory manager would expect to buy a machine, use it daily for 30 years without inspecting, servicing, or repairing it, and have it still in the same condition as the day it was brought into the plant. Yet this is the attitude most of us have toward eyes.

We check the worker's vision at the time he is hired and presume it will always be the same. The figures that have been quoted indicate that this is an unwarranted assumption.

It is estimated that 83% of knowledge is acquired through vision and 80% of activities are controlled by the eyes. That makes the eyes of employees the most valuable machine in the plant. And it means that only when eyesight is properly corrected and its use is properly engineered, will full production be possible.

Job Security No. 1 Factor Affecting Employee Morale

Attitudes of employees, as contrasted to labor leaders and employers, were recently released in a report by the National Industrial Conference Board, Inc., on a survey of factors affecting employee morale. The survey covered a list of 71 possible factors, and included varied types of employment. Employees of six companies in different parts of the country were asked to choose five factors in order of their importance.

Companies involved in the survey included two chemical plants in different locations, but under the same management, an electric products manufacturer, a printing and publishing house, a metal products manufacturer, and a mechanical gadget manufacturer.

Job security was selected by the largest number of cooperating employees in each of the six companies by the composite figure of 30.7%. The second rating, 8.7% was given to compensation. Range over the six companies varied on job security from 47.4 to 18.8%, while on compensation, from 15.7% to 3.0%. Extra compensation plans including bonuses were selected as first by only 0.5%. Type of work appeared consistently, receiving a high percentage.

The frequency with which each factor was ranked somewhere among the top five, included job security at 44.7%, opportunity for advancement at 30.7%, and compensation at 27.9%. All 71 factors were mentioned by at least one employee in their lists of top five, while an average of 31 factors was given first choice by some workers of each company. A fundamental principle of modern personnel administration, that of individuality of employee, is sharply illustrated by the wide variation of choice.

Many factors tend to limit the accuracy of the results obtained. Degree of frankness of replies should be considered, as well as varied interpretation of wording, degree of attention given to the survey, and the psychology of choice, based on the satisfaction of the employee in his immediate job.

Predictions of executives and labor leaders placed emphasis on compensation, listing job security as second. Contrasting percentages show that 75% of this group chose compensation first as compared with less than 30% of the employee group.

The report uncovered the eagerness of the employee for job recognition in regard to the question "How am I doing?" Executives more than labor leaders revealed close understanding of the importance of employee financial benefits, such as group life insurance, hospitalization, and pensions. Importance of opportunity for advancement, indicated by employees, was overlooked by a majority of labor leaders. Executives and labor leaders more strongly than employees stressed physical working conditions.

Labor placed more emphasis on total hours worked per day or per week than either of the other two groups, while their ranking of vacation and holiday practices more closely approximated that of the employee group than did management, (8th and 7th place respectively, as compared with 3rd place by executives).

A survey made by the National Retail Dry Goods Assoc. in 1939, also revealed that management erroneously believes pay to be the chief concern of labor. Yet, this report differs sharply from the Conference Board's results in that employees ranked job security last, while employers positioned it in second place.

It will be recognized that significance should be placed on various relationships of the employee to his job. His age, sex, seniority, and type of work are to be considered.

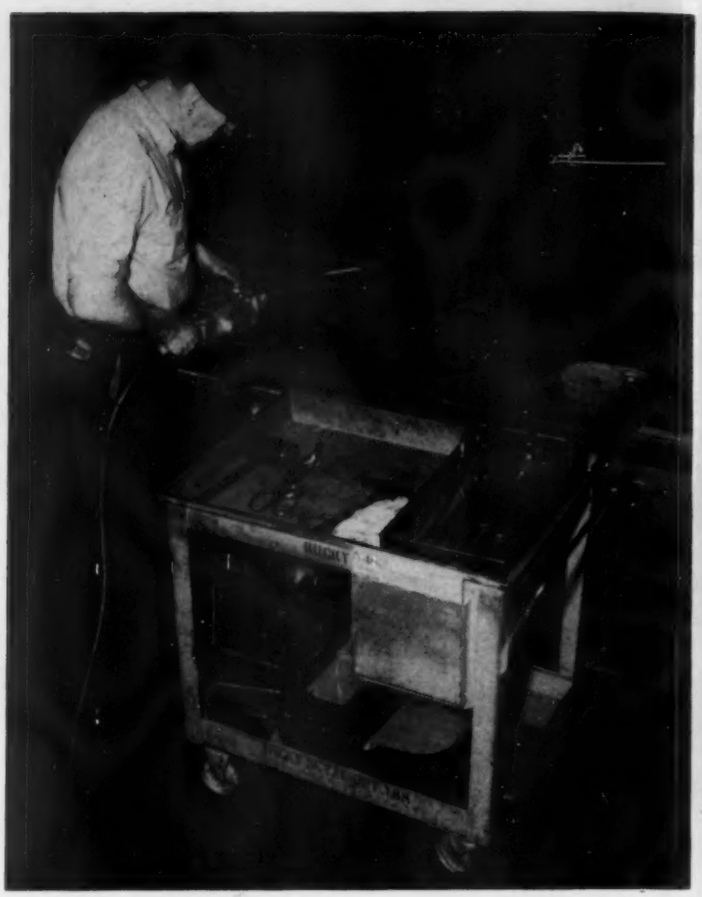
Survey indicates that clerical workers include opportunity for advancement in the company as one of the salient features to be included among the top five. Vacation and holiday practices received top ranking from the largest single group of women considered. Compensation is of greater importance to a larger number of women than men. Men rather than women place emphasis on opportunity for advancement.

This generalized sampling shows considerable variation among companies as well as individuals. Interpretation or application therefore must be considered in the light of these limitations.

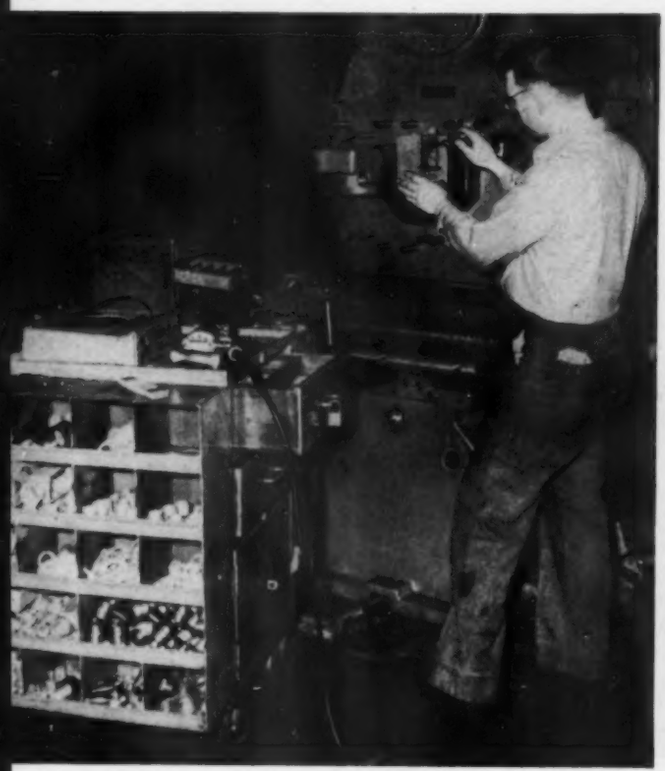
SHOP CARTS CARRY ALL THE TOOLS

Complete tool selections travel with roving NATCO workers in castered hand trucks, eliminating time wasted in chasing forgotten assembly equipment

BY A. B. McCREA
FACTORY MANAGER
NATIONAL AUTOMATIC TOOL COMPANY, INC.



Unlike the plumber who never takes the right tools to his job, **NATCO** assemblers tote all their tools on small carts. Sheet-metal worker can lock his tools in a caster-mounted cart



Electrician's cart carries fittings and connectors for wiring machines on assembly floor. Two fixed and two swiveled casters support traveling stock bin

Machine-assembler's tool cart has bench vise and tool chest attached. Drawers hold larger tools and equipment. Cart measures 25 by 43 in. and is 32 in. high.

Precision gages are loaded on inspector's cart. Power from plant air line is drained with quick-acting fittings. These gages check honed holes in hydraulic control valves

Plant photographer hauls transformer equipment for floodlights in two-wheel cart. A second cart carries cameras and various attachments

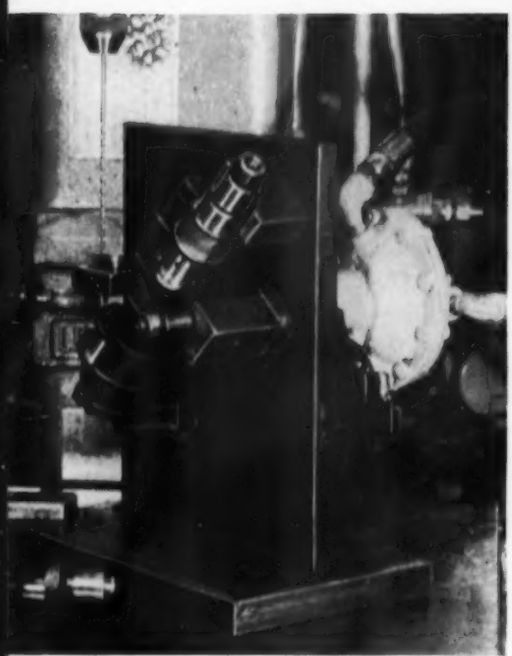
Smaller tools used by electrician for wiring control panels are carried on smaller cart. Personal and company-owned tools are protected in drawers that can be locked

Pneumatic Muscles Clamp and Assemble

BY CHESTER S. RICKER, DETROIT EDITOR

Bendix-Westinghouse production men find their own air-brake cylinders can take over 500 heavy jobs. Typical ones described may suggest air applications for you

TESTING of compressors no longer requires crankcase hold-down bolts, connections, and cylinder-head nuts. Air-clamping eliminates these fasteners, and the resultant direct labor saving exceeds $5000 per year



DEEP DRILLING requires rigid clamping of work because shifting of piece or vibration can cause drill breakage. One operator now has time to operate four fixtures (drill is power fed), and the output per manhour has doubled with less effort than with mechanical clamping

IT'S NEWS when the doctor takes his own medicine. Bendix-Westinghouse Automotive Air Brake Company, Elyria, Ohio, has been making automotive air-brake operating devices for years, but it took some of the firm's own production men to open the eyes of management to the possibilities of these units for shop purposes. Now these "Robotair" cylinders have been applied to over 500 jobs.

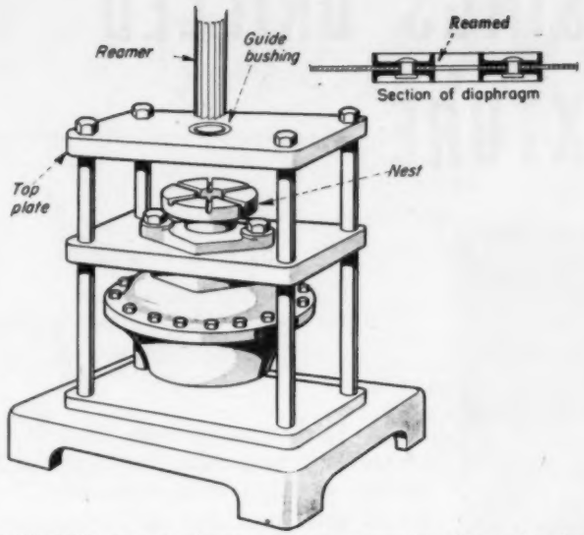
The device, an air chamber with a flat diaphragm, is connected through a control valve to the compressed-air line of the plant, is quick-acting and requires little operator effort, and is readily installed on new and old machinery. A newer unit, called "Rotochamber," has a tubular diaphragm and thus has a smaller diameter for an equivalent effective diaphragm area. Depending upon the size and type of unit the total force on the piston rod ranges from 884 to 4907 lb. with 100-psi. air pressure, and stroke varies from 1¾ to 4 in.

Principal applications are (1) clamping fixtures, either single or multiple, (2) bench arbor presses, (3) vises and (4) inspection fixtures.

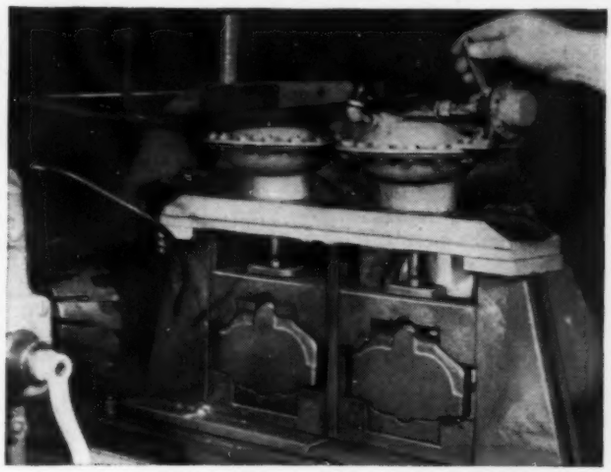
In working out details, experience indicates that there are several general factors to be considered in determining the method of application. These include the machine on which the fixtures are used, the shape of the work, clearances and clamping pressures required. Most units are attached directly to the reaction, or anchor, plate which may be arranged in the most convenient way for mounting and operating when the fixture is designed, but bracket units can be used for special applications. The air force is transmitted by levers, slides, wedges or toggles, depending upon individual requirements.

Control of the action produced by the unit is obtained by placing a lever-operated air valve in the line. A choice among fire valves may be made. On one the handle remains in either the released or applied position; on a second the handle automatically returns to the released position. In a pressure-control type, handle position determines the pressure delivered to the operating cylinders and permits variations from 0 to 80 psi., regardless of higher line pressure. A fourth type is for double-acting applications and the fifth is a special 3-way valve to control two chambers alternately. Some of these can be interconnected with air-operated feeds so the latter will start as soon as the work is clamped.

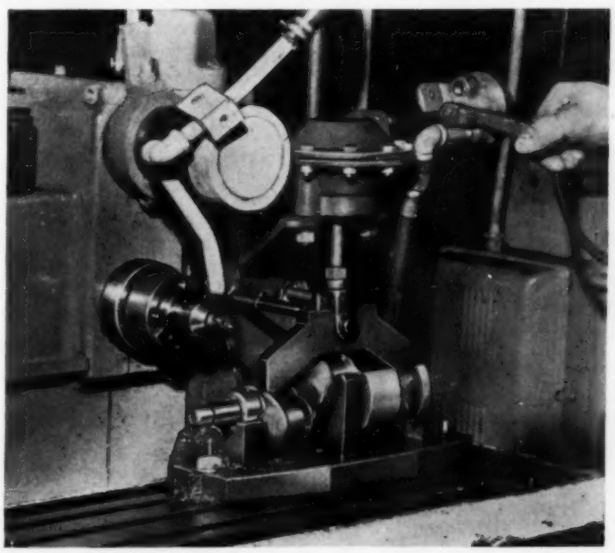
Determination of the feasibility of an application is based upon the length of time spent in handling as compared to the over-all operation time. Bendix-Westinghouse men found "Robotair" most valuable on operations requiring 6 or more reversals per minute. However, even on jobs on which the machining time is long compared to handling, possibilities for savings may exist through multiple clamping of several pieces.



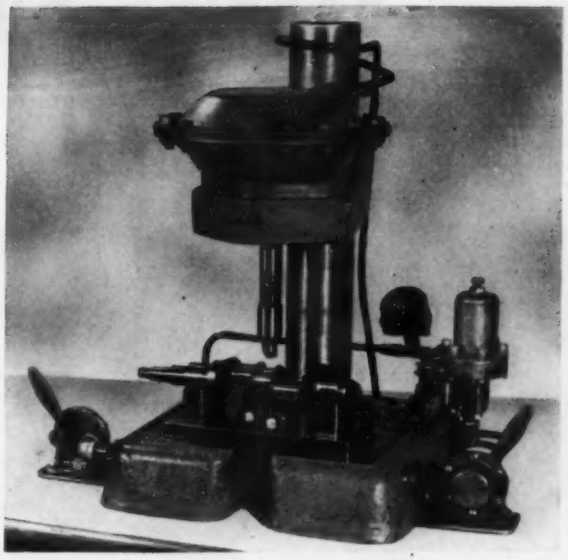
REAMING the washers used on opposite sides of a balloon-cloth diaphragm is done with the tool shown. The nest holds the diaphragm against the top plate



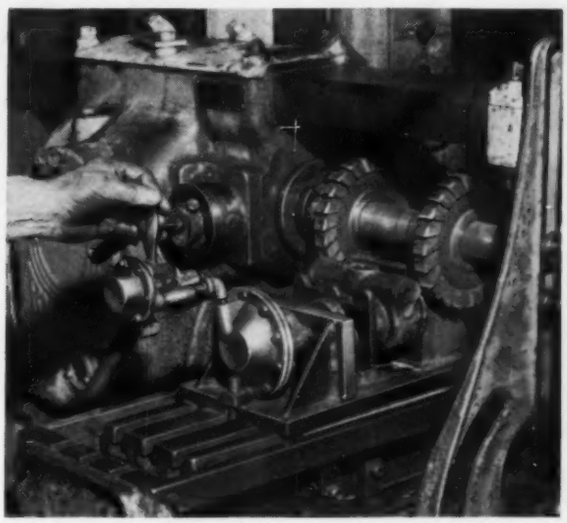
MILLING output is increased 40% because of quicker loading and heavier cuts. Rigid clamping for each cylinder head is obtained by using two separate Robotair units operated by a single valve



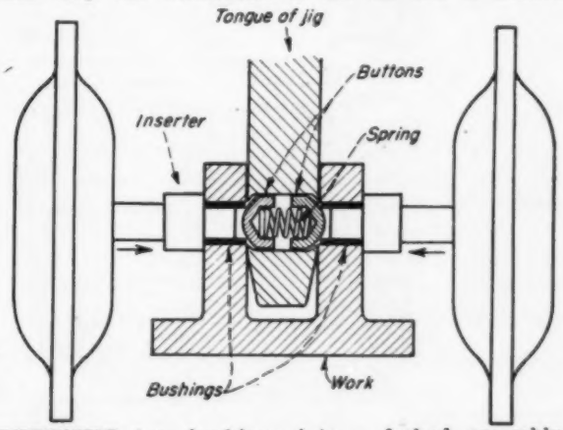
KEYWAY-MILLING application results in a saving of $50 a month in direct labor. Whiffle-tree clamp transmits the pressure required to hold the crankshaft



ASSEMBLING parts in a range of sizes is possible on this press arrangement because the height of the ram is adjustable. Base is notched to permit push-out operations



STRADDLE-MILLING fixture is a simple weldment that can be fastened to any available milling machine. Air valve is part of the removable assembly and only one connection to the air line is needed

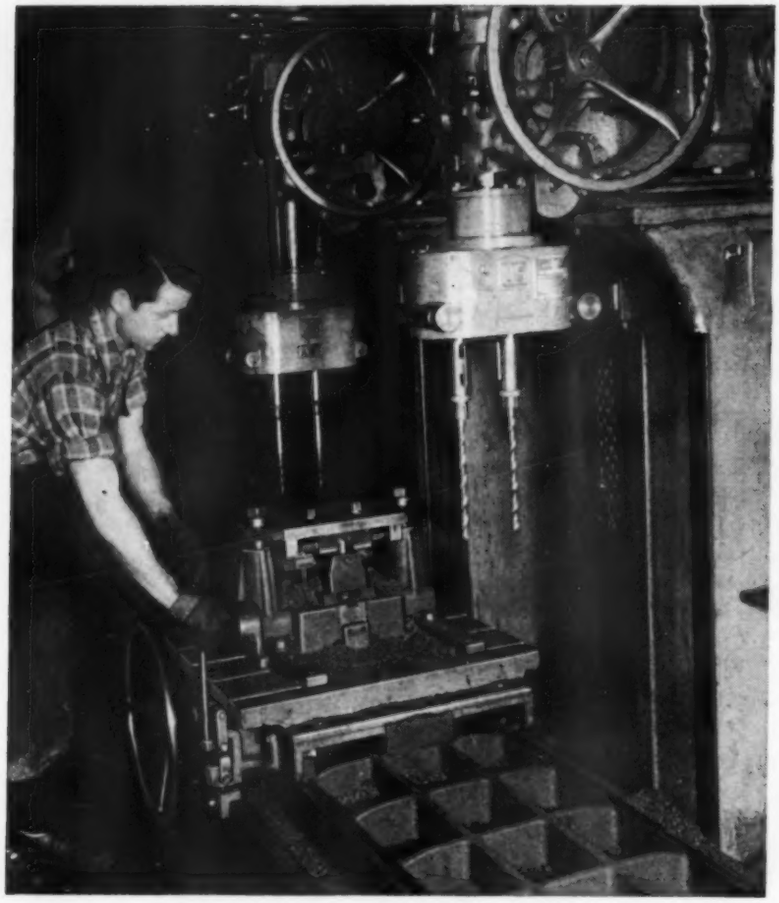


PRESSING two bushings into a forked assembly without deflecting the bushed lugs is accomplished simultaneously in this setup. Spring-loaded buttons locate the work and each piston rod carries the bushing which it inserts

BEARING HOUSINGS DRILLED WITH RAIL FIXTURE

BY L. C. HEINLEIN

Asst. Superintendent
Dodge Plant, Ball & Roller Bearing Division
LINK-BELT COMPANY

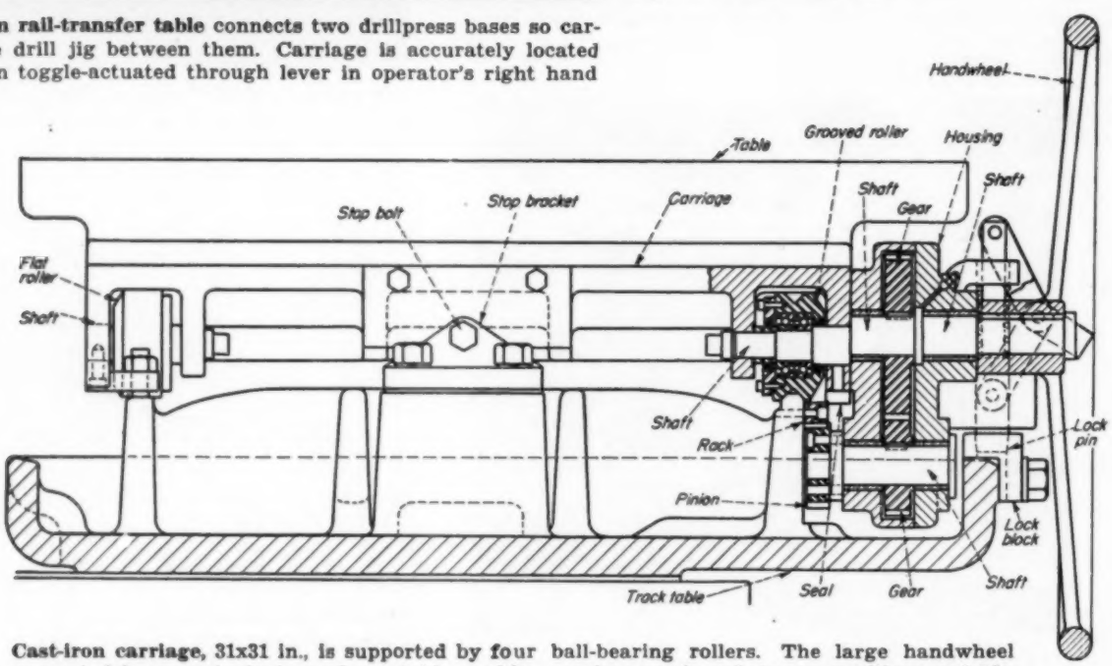


Special cast-iron rail-transfer table connects two drillpress bases so carriage can move drill jig between them. Carriage is accurately located by a tapered pin toggle-actuated through lever in operator's right hand

Two Barnes drillpresses are teamed in a transfer-machining setup at the Dodge Plant of Link-Belt Company. Purpose is to drill bolt and dowel-pin holes in bases and caps for split pillow-block housings. Each machine is equipped with a special two-spindle drillhead and separate heads are attached for housings with different spacing between the bolt holes.

Table has a V and a flat rail on which the carriage travels, and a third rail in front to which locating blocks are bolted. A tapered lock-pin mounted on the carriage fits into tapered hole in blocks to locate the carriage accurately in each of the two spindle positions. Several bolting positions are provided for setting-up.

Carriage on the rail table is mounted on two cylindrical and two grooved rollers as indicated in the sketch. Brackets at each end of the table prevent carriage over-running. T-slots in the top surface of the carriage are for mounting different jigs to suit various parts.



Cast-iron carriage, 31x31 in., is supported by four ball-bearing rollers. The large handwheel connected by gear train to rack on table enables moving carriage between positions quickly

TALKING SHOP

Metallizing Moves Up

LATEST APPLICATIONS of sprayed metal are in protecting retorts, providing circuits on diminutive radios and in "Thermopane" windows. Steel retorts are now sprayed with Nichrome (which is porous), then with aluminum to fill the holes. This seals the retort surface against flame, which would cause corrosion, short life. . . . For radio circuits, the insulated panel is masked, then metal is sprayed on to make connections between projecting wires. . . . To assure an airtight joint between the parallel panes of a "Thermopane" window and the brass edge molding, panes are first sprayed with zinc so the channel molding can be soldered on.

Bonding in repairing shafts has also been improved. A coat of manganese is now sprayed on before the new coat of steel. This permits use of harder steel alloys, increasing life from two to six times. Rebuilt surfaces are finished by grinding.

Cast Drive

BUICK is using a metallic-asbestos lining, cemented in place, in the brake band of the new "Dynaflow" transmission. It is cut with carbide tools . . . Sundstrand has built a special vertical-spindle contour miller to profile the steel brake band from a forged-steel ring.

The five rotors of the torque converter in the "Dynaflow" are precision castings of aluminum alloy, made by Allison. The drive also has three permanent-mold aluminum castings: the oil-distributor unit from pump to converter, clutch and servo-unit; the servo-unit itself; and the control valve. All oil passages are cast, eliminating connections, fittings and tubing.

Ordnance Jeep

WILLYS-OVERLAND has just delivered first 4-wheel-drive Jeep station wagons for U.S. Army Ordnance. They are like the usual Jeep station wagon (*A.M.*, Jan. 1) with full-floating driving and steering front axle, heavier rear axle, and 2.43:1 ratio in transmission underdrive. Semi-elliptic springs are used, about 20% stiffer than for civilian service. Divided steel wheels, protected headlights, front winch and rear pintle are distinctly military adjuncts. Weight is about 350 lb. over civilian units, and the wagons can handle a 57% grade in 4-wheel, can get to 60 mph. on roads, carry 1000 lb. Wheelbase is 104½ in., tread 57.687 in. in front and 55.5 in rear. Over-all length is 176.8 in., minimum road clearance 8 19/32 in.

Automatic Dismantling

THE TOOLMAKER who built the piston and con-rod assembling machine for Ford (*A.M.*, April 8) is now building several more for Ford and others for one G.M. division . . . Present experiments are with automatic dismantling machines for con-rods and caps. These would number-stamp cap and rod, remove nuts and keep units in order for remating in the engine in later reassembly.

Plastics Babel

WILLARD L. MORRISON, JR., of Montgomery, Ward & Co., accused the plastics industry of creating its own Babel at a session of the S.P.E. meeting in Chicago. He said: "Each plastic material is being saddled with dozens of tradenames which are being added to month by month. It would seem that you are almost deliberately complicating the problem . . ."

His remedy: restraint—and a glossary of trade names.

Color, Sir?

COLOR is funny stuff. The automotive industry has known for years that region, age, ancestry and economic conditions all affect auto buyers in their choice of color. In the Southwest, where the sun is bright, vivid colors are preferred. The Pacific Coast takes light pastels. Desert areas like tan and beige. New England wants suppressed blues, maroons, greens and grays.

During the depression, 60 to 75% of car buyers wanted black or dark blue; today black interests less than 20%. Today's choices are 'flashy'—one company reporting 2-tone combinations rising from a third of the total in 1941 to over half of today's output. Green, alone or in 2-tone jobs, now goes on 26% of this firm's cars, blue on 21%, gray on 16%, beige on 11%, maroon on 7%.

Other polls indicate that intellectuals go for blue, athletes for red, egotists for yellow and extroverts for orange. Hindus and Chinese consider yellow lucky; Mohammedans and Irishmen prefer green. Latins (and brunettes) like red; blondes take blue or green.

What this will mean to color-tone shops, only time can tell.

Daffynitions

BOOKKEEPER: man who borrows books. HYPOCRITE: man lecturing on "confidence," while wearing suspenders and a belt. STORK: wise old bird who kids the world. MODERN GIRL: one who dresses to kill, and cooks the same way. COUNTERFEITER: man who coins money. HIGHBROW: man who enjoys things until they become popular. FAN DANCER: a hipnotizer. RADIO: the din you love to shush. FAMILY-SIZE ECONOMY PACKAGE: five times what any family can use. I.O.U.: paper wait. DENTIST: he'll bore you to tears.

CHAIN AND BELT CONVEYORS HANDLE DIE-CAST PRODUCTS

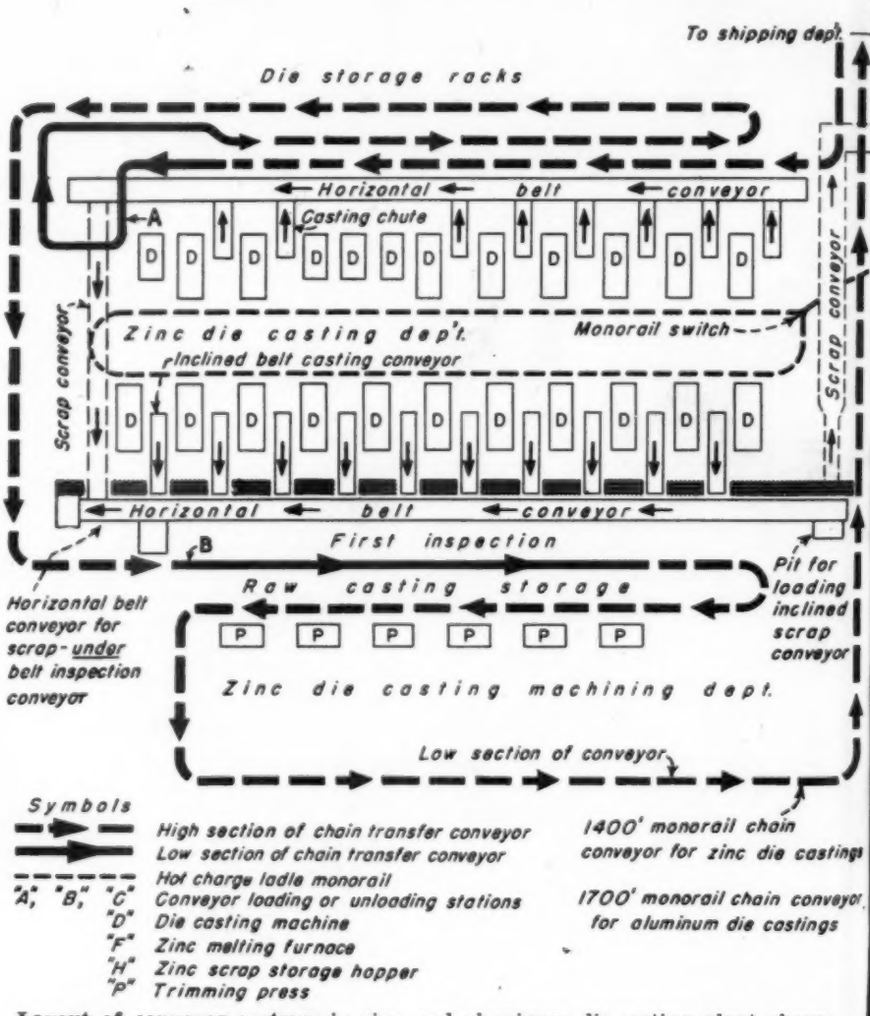
Inclined 18-in. belt conveyor beside each high-production die casting machine raises zinc "gates" 5 ft. through wall opening to inspectors. Water spray cools castings to handling temperature

By carrying its handling problems to a near-complete mechanization, Stewart has chopped it labor charges to a minimum

BY B. C. BROSHEER
ASSOCIATE EDITOR

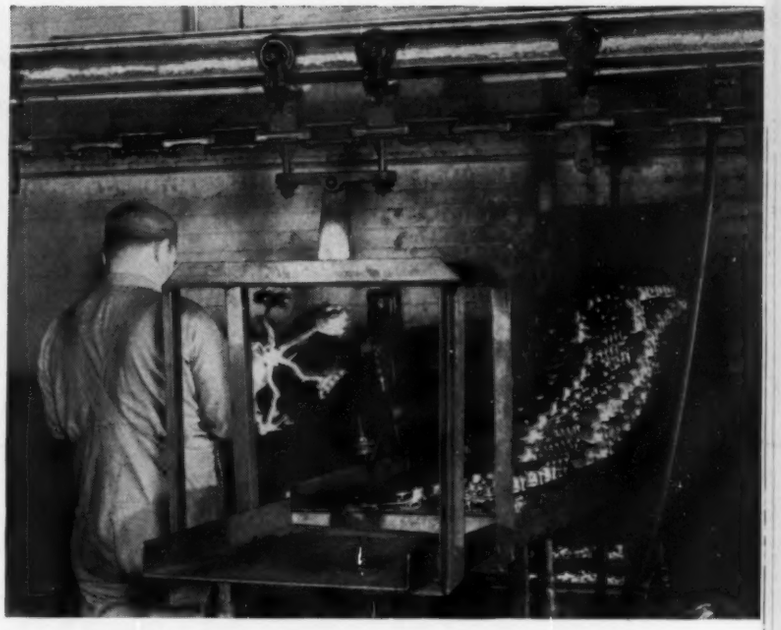
HANDLING of mass-produced zinc and aluminum die castings and aluminum permanent-mold castings is made almost completely mechanical by 7,250 ft. of conveyor lines in Steward Die Casting's Chicago plant. By limiting manual handling to work stations and cutting hand and power trucking to a bare minimum, Stewart has made substantial labor savings.

The plant has a wide range of casting facilities to produce over 65 tons of castings in each 16-hr. day. The weight of zinc castings ranges from a few fractions of an ounce to 20 lb., and aluminum castings vary up to 9 lb. To eliminate danger of metal contamination, the zinc and aluminum divisions are kept separated throughout the plant. Separate melting and casting departments are maintained and the machining section is divided between the two metal products.

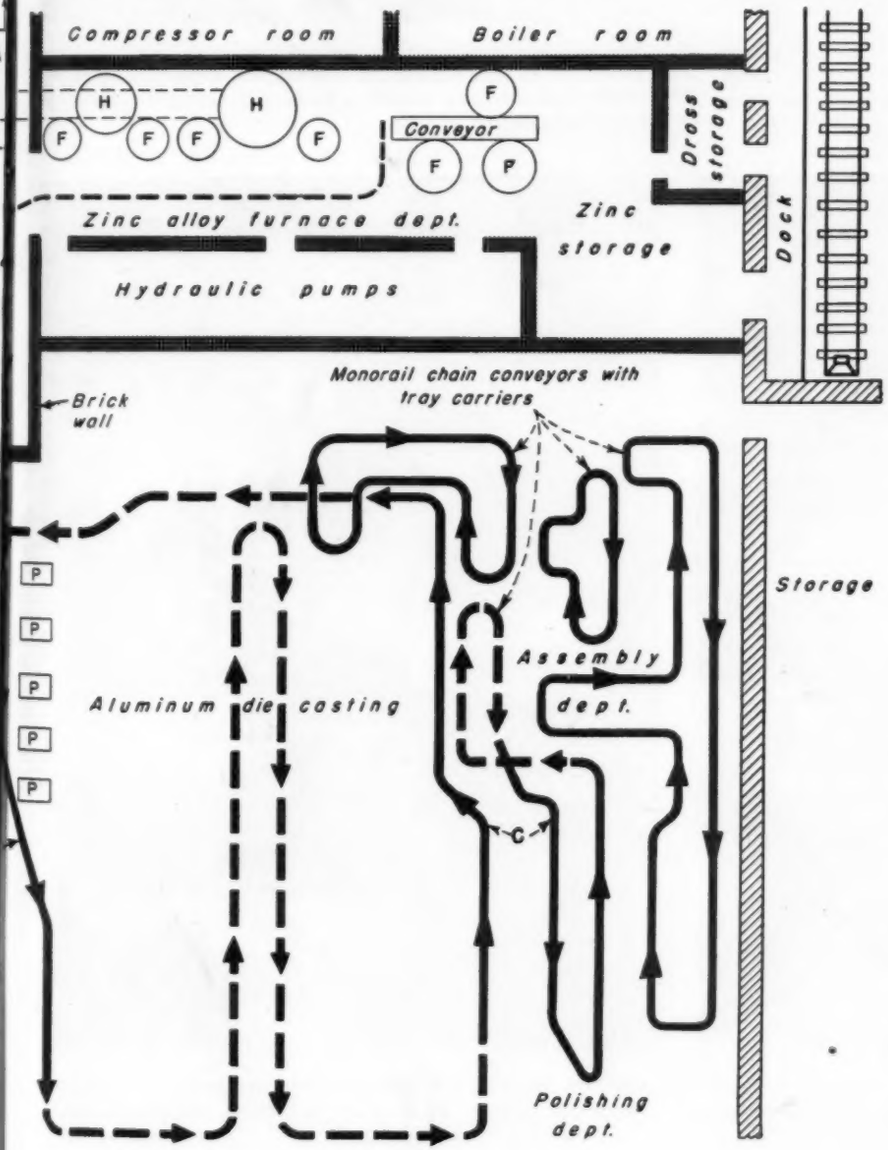


Layout of conveyor systems in zinc and aluminum die-casting plant shows routing of materials and parts. Zinc-casting department sends scrap along apron conveyor to elevating conveyor. This raises scrap to level of remelting furnace hoppers at top right of layout. Die cast parts flow from machines on short belts to inspectors, then are carried by overhead conveyor to trimming presses. Aluminum castings are moved by overhead conveyors

Inspector receives castings on 150-ft.-long belt conveyor. Apron conveyor below belt carries scrap to elevating-conveyor pit. Good castings are placed in tote boxes for delivery to trimming presses



Small castings are checked at another point along belt conveyor. Accepted parts, grouped in tote boxes, are placed on overhead conveyor line carrier which move them to presses for trimming



A 1400-ft. overhead conveyor serves the zinc die-casting department, moving cast and inspected parts from inspector to the trimming presses and from there to the machining groups. After machining, the parts are carried by the same conveyor out to the shipping department. The long conveyor is served by a system of short belts that move castings from die-casting machines to inspectors.

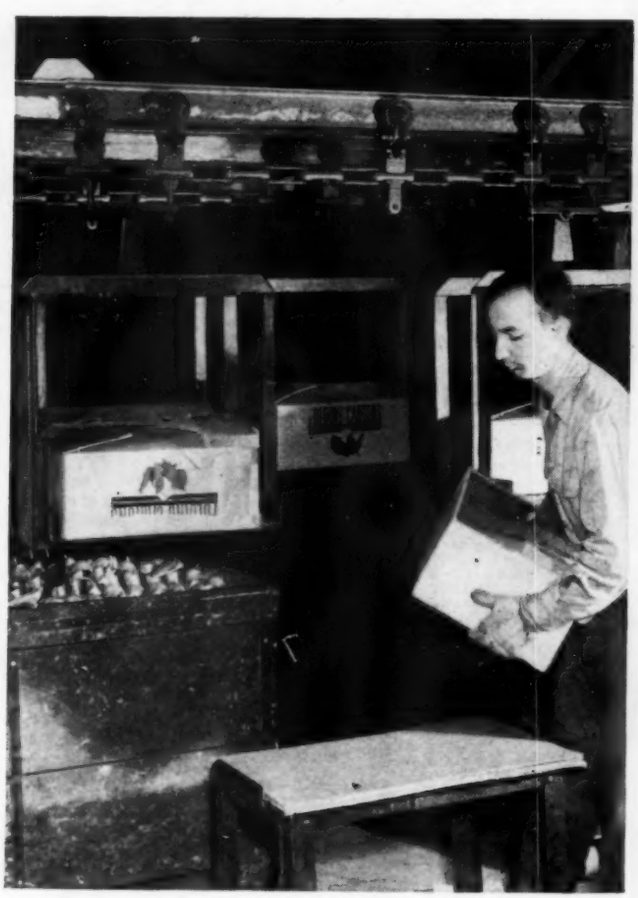
In the aluminum casting department a 1700-ft. conveyor performs all comparable handling jobs for the aluminum parts. No belts are used, but feeder operations are maintained by smaller monorail conveyors. The permanent-mold aluminum-production department is served by a 1000-ft. overhead conveyor connecting the casting machines with the machining department.

Three apron-type scrap conveyors transfer broken-off gates and runners and rejected moldings to the remelting-furnace hoppers—30 ft. above the plant floor. More than 1800 ft. of miscellaneous work-line chain transfer conveyors help swell the total footage of mechanical handling equipment.

Scrap delivered to pit by apron conveyor or by truck from trimming presses is dumped onto lower end of apron-type elevator conveyor. Lift of 30 ft. delivers the scrap to scrap-storage hopper chutes

Die castings are hung on special hooks on the overhead conveyor in the aluminum die-casting department. Conveyor dips at each machine to ease loading, but is kept high enough for clearance

Overhead monorail serves the permanent-mold casting department. Aluminum castings are checked by inspector at each machine before being hung on the conveyor



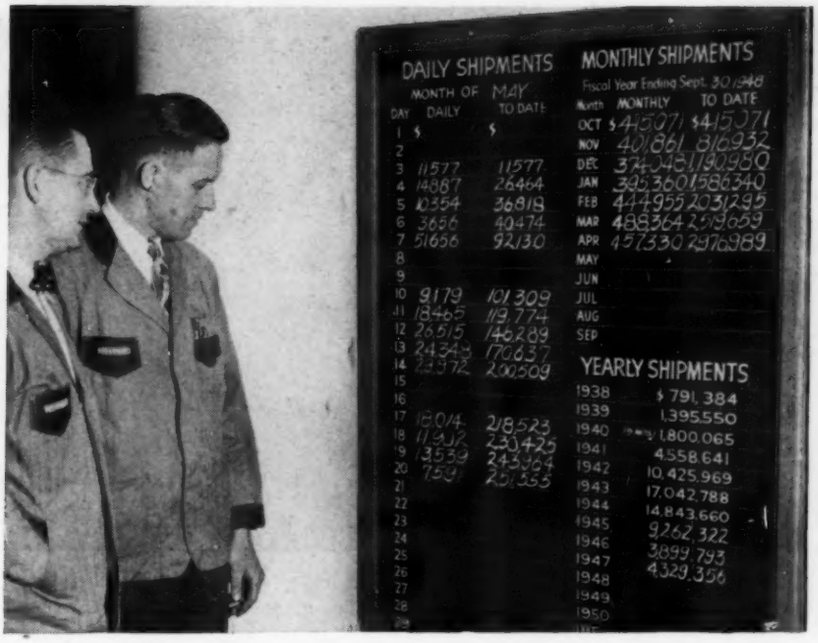
Cartons of finished castings are delivered to shipping room for storage or loading in trucks. Packaged parts are transferred to floor trucks at conveyor stations

AN UNUSUAL MANAGEMENT PHILOSOPHY

Woodward Governor, purposely held to 500 employees, has some unconventional policies that have worked successfully over many years

BY IRL C. MARTIN, President

WOODWARD GOVERNOR COMPANY



Elwyn Olson and Larry Gustafson (right) inspect the daily shipment record posted in the Recreation Area

Four candidates for State's Attorney of Winnebago County visited Woodward just before the April primaries to give "minute biographies" of their qualifications. They were guests of the Legislative Committee (Chairman Chas. Thomas, center)

WE BELIEVE that a company of 500 employees is the top limit that we can operate successfully. We have found that with such a restriction on numbers, we can enjoy our work, give sufficient time to the upbringing of our families and contribute adequately to the welfare of the community. We have eliminated size as a source of personnel problems.

Pensions, social security, unemployment compensation and personnel maintenance favor our type of organization today—of minimum size and high quality.

For a long time we have been evolving a pay system which eliminates many irritations by encouraging and working with the employee's natural tendencies instead of against them. For want of a better name we call it the "Corporate Partnership" plan.

It is a simulated partnership between the worker and the stockholder under the impartial direction of the management. It is a simulated partnership because the law unfortunately does not provide a liability limit for partnerships. The Wages and Hours Act also handicaps the plan's proper operation.

The plan includes a basic wage for the stockholder's dollars and a basic wage for the worker's talent or work. Any income over and above that required to pay base wages and other necessary business expenses is divided equitably and at the discretion of the Board of Directors between workers and stockholders.

All our workers are business men and are as aware of the need for paying capital as is the most ardent capitalist. They know also what a reasonable return is. They know the minimum base income they would want if they were to become head of the organization. We decided, therefore, to establish these base minimums by secret ballot in a general family meeting.

The minimum base return on capital was established at approximately 5%. In general, our base wages are comparable to the straight-time wages in our area. The minimum base for the least valuable worker was established as a percentage of the minimum base for the head of the company. Everybody else in the company is integrated between the lowest and highest bases.

By eliminating most of the normal grounds for controversy, full attention can be focused on pro-

Funds for major parties are derived from such events as bingo parties—this one so big people overflowed the cafeteria into the recreation area. More than 300 attended, and the Recreation Committee reported a reasonable profit

duction and profit rather than on hours of work and hourly rates. The pay bracket into which each member falls is in ratio to his relative value to the company rather than to his particular work classification. The relative value of each man is determined by a series of ratings. Each year every man in the company, including the head, is rated and his base pay for the year set. These ratings are astonishingly accurate.

Base rates on both capital and labor, along with goods and services, taxes, personnel, facilities, maintenance and depreciation, are considered part of the cost of doing business. Costs of all benefits which accrue exclusively to the stockholder or worker are theoretically charged against him for educational purposes. Workers, for instance, are charged for overtime, social security, unemployment compensation, etc.

A comparative monthly balance sheet, as well as a comparative monthly record of shipments, is posted in the rest areas, and fully discussed in monthly family meetings. Each member can see for himself the benefits of higher efficiency, and the financial penalty for carelessness and indolence.

To protect the company as a whole from an uneconomical age level and to assure the younger members an opportunity to move into better jobs, a personnel amortization program recently was inaugurated. It is not a retirement or pension plan as the terms normally imply. The amount to be received at age 65 will provide only for a subsistence level of living. Each member, including company officials, will be treated the same on the theory that it takes just as much for subsistence of one man as another. Provision for anything above that level will be the responsibility of the individual member who has been and, it is hoped, will be well paid during his working life.

The high-test gasoline which keeps the human being humming is commonly known as ego. Normally, vocations are insufficient to keep our egos well fed and healthy. Each of us should develop an avocation. In our company we set up committees as mediums of education and as vehicles for some of our surplus energy. The work of the committees has no direct relationship to the routine operation of the plant. That was and is the job of the executive and supervisory staffs. The big job of the committees is public relations. They are all members of our industrial family; it is their task to look after the family's legitimate interests. We now have committees on Legislation, Finance, Health, Recreation, Veterans and Open-Door.

Each committee is headed by a permanent chairman and a co-chairman appointed from the senior and junior executive staffs respectively. Committee members are elected by popular vote to the committees of their choice. The only obligation upon a committee member is to consider the welfare of the company ahead of any personal consideration.

The Legislative Committee's job is to study and recommend to the family the passage or defeat of such laws as it feels will affect the company. It also investigates the qualifications of all candidates for office and posts its choice on the bulletin board ahead of election. The committee members realize that no matter how hard we all work, or how good our judgment proves to be, our best efforts can readily be nullified by detrimental or inequitable legislation enacted by our political representatives.

Accurate determination of the best-qualified aspirants for office is very important. As the head of the company, I have the opportunity of discussing the decisions of the committee with the members before posting. Whether I agree or not, I vote the way the committee recommends. If I can't guide the committee's thinking in the right direction, it is just as well that I accept judgment of the members—they may be right. To date, I am proud of the judgment and civic integrity displayed

Santa Claus talks to Kathie Greenman at the '47 Christmas party for members' children in the Woodward auditorium—an affair planned by the Recreation Committee as one of the year's many social events

Mr. and Mrs. Cliff Milburn make a predatory approach to the turkey they won at a company party. This and other photos here were duly printed in the company magazine, "Prime Mover Control"

by this committee. As an organization we have supported and elected many of our own people to public office. They are all doing fine jobs. They are our contribution as an industrial family to the political welfare of our community, state and nation.

The Finance Committee's job is to investigate and recommend contributions of the company as well as of individual employees to various causes. I find they are much more prudent than I am. The experiment has been economical as well as educational. The committee's report and recommendation in connection with the local Community Fund has been a part of the literature used by the general Fund Committee for several years. In conjunction with the Legislative Committee, the Finance Committee studies and makes recommendations on all legislation local, state or national—which will result in an increase or decrease in taxes.

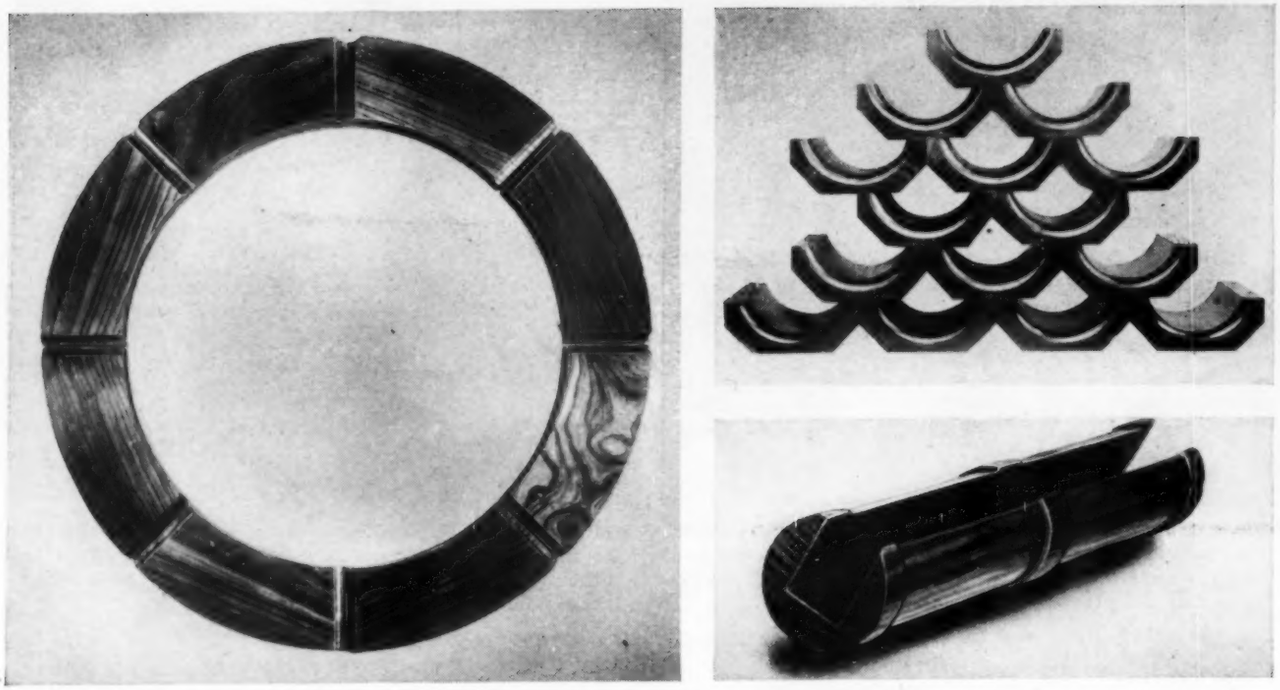
The Health Committee is the watch dog on health maintenance and accident prevention in addition to advising the cafeteria on menus and prices. The program is divided into preventive medicine and curative medicine. We have twice been recognized as one of the few plants in the United States to attain an accident frequency rate of only 1.98 and a severity rate of 0.008. Our worker's compensation rate is 15 to 20% of the average rate for manufacturing companies in our area.

The Recreation Committee has charge of a softball field, croquet and quoit courts, four bowling alleys, a rifle and pistol range, small games and membership in the industrial baseball, basketball, and bowling leagues. It also manages the auditorium. Social events are scheduled to provide a balanced diet of lectures, plays, dances, movie shows and games. The auditorium is completely air-conditioned and sound-proofed and is provided with all the facilities found in a high-grade small theater. The committee receives no financial support from the company. Members do not get time off to carry out their assignments.

The Veterans' Committee is in charge of all veterans' affairs, including formal education. It initiated and is helping to maintain a cooperative engineering course in Rockford. It has the special responsibility of assuring to the veteran those rights accorded him as a result of his service. The company's financial, social and political influence is always aggressively available to any aggrieved member. It has been necessary to use it occasionally in support of the veteran in his fight with governmental red tape and inefficiency.

The Open Door Committee is as its name implies a standing committee without a particular job. Any problem not specifically covered by one of the other committees is automatically referred to it for solution.

The principal reason our company has had no personnel difficulties throughout its existence is because it has always been operated as a means to a satisfactory life rather than just as a means for making money. Our employees have been carefully selected on the basis of their competence or prospective competence for our work, the excellence of their health—moral and physical—and their agreeable nature. Our industrial family is built upon a foundation of mutual faith in the ability and integrity of our members. The members are proud of their heritage and of the reputation of their products. Each member is kept fully informed of the financial and trade condition of the company and is compensated as accurately as possible for his relative contribution to the total endeavor. He is treated with equal consideration and respect and his social equality is never questioned. Our family discipline is relatively strict but scrupulously fair and impartial. The full power and prestige of the company is solidly back of each member so long as his conduct is a credit to the family.



WOOD BEARINGS . . . A 36-in. dia. segmental thrust bearing for sewage-disposal equipment, a group of typical roll-neck bearings for skelp and cold-finishing mills, and an elevator guide exemplify applications of lignum-vitae in modern industrial service

How to Handle Lignum-Vitae

Widely used as a bearing material because of its self-lubricating properties, this strange tropical hardwood can be machined on standard metalworking machines

BY H. E. LINSLEY, ASSOCIATE EDITOR

DESPITE all the advances of technology, there are still some materials for which no suitable substitute has been found, and which man has not yet been able to synthesize. Among these is a strange, tropical wood called lignum-vitae. Hardest of all woods, it is extensively used for bearings, and possesses the peculiar property of never requiring lubrication, as some 30% of its volume is natural oils and gums. Water, however, is frequently used as a coolant and to assist in lubrication.

Tests on roll-neck bearings have shown that this wood will outlast brass or babbitt about 10 to 1, and that all the wear takes place in the bearing itself. The journal becomes highly glazed but does not show any dimensional change or scoring.

Care must be exercised in handling the material, and if spare bearings are to be stocked as replacements, they should not be machined to finished size until immediately before use, as there may be some shrinkage. If possible, the unfinished bearing should be brought into the area in which it is to be used, and allowed to stand for a day or two to adjust itself to prevailing atmospheric conditions. A roughing cut may be taken before this, but finish sizing should not be done until the wood has adjusted itself.

Immediately after finishing, the piece should be coated with shellac or paraffin to preserve its resin-moisture ratio and to prevent cracking. Once the wood has attained its moisture equilibrium with the atmosphere or under working conditions, the coating is no longer necessary.

If the bearing is to be used under water, it should be soaked for three or four days, roughed out, resoaked, and finally sized.

Machining should be done dry, and conventional metalworking machines can be used. High surface speeds are required, at least 1000 sfm., and the chips will come off as a fine yellow dust. Because of its highly oily nature, this may not do any harm to the machine, but it is advisable to wipe off any heavy accumulation. The oil will not harm the skin, and indeed, is

reputed to possess certain therapeutic properties. The usual precautions should be taken in removing slivers from the flesh, although workers who constantly handle the material claim that such slivers will not fester.

If large holes are to be bored, it is good practice to trepan them and save the center slug for some other application. If for nothing else, it makes an excellent hammer head that will stand hard use and will not damage finished surfaces. High speed steel tools should be used, and a 7° rake and 15° clearance is recommended. Carbide tools are not usually necessary, but Kinite steel has been found particularly suitable for resisting the abrasive action.

For drilling, ordinary high speed twist drills should be used, as carpenters' auger bits are not suitable. Holes can be tapped successfully, either by hand tapping or on a leadscrew tapper, but external threads are difficult to cut and should be avoided if possible. Where threads must be produced, they should be milled, as a die will tear out pieces of the wood.

Applications of lignum-vitae can be found in almost every industry, and range from tiny rollers for venetian blinds to propeller-shaft bearings in ships. It cannot, however, be used indiscriminately, and any new application should be carefully investigated. Lignum-Vitae Products Corp., Jersey City, N. J., leading importer of the wood, and largest fabricator of tropical hardwood products, recommends that operating temperatures do not exceed 150 F. Above this temperature, the resins appear to disintegrate, and the fibers of the wood loosen.

"Lig" should not be used in contact with solvents such as alcohol or ether, as these dissolve the resin, destroy the self-lubricating properties, and render the wood friable. Strong acids will also have a harmful effect.

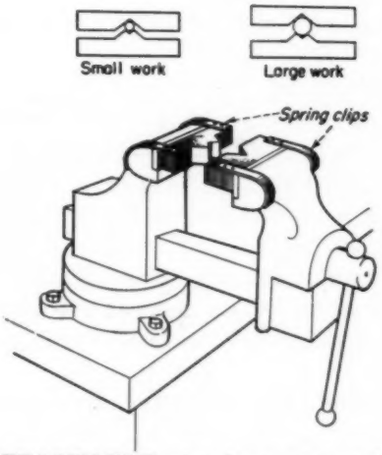
Working pressures should not exceed 2000 psi., and as a general rule, journal speeds should not exceed 200 fpm. However, bearings on submerged phosphorus pumps have operated successfully at 1200 rpm.

Alkalis, mild acids, fruit juices and similar materials appear to have little or no effect on the wood, and it is particularly useful in food, drug and cosmetic industries, as it is non-contaminating.

Size of lignum-vitae parts is somewhat limited by the fact that logs do not usually exceed 24 in. in dia., and 4 to 6 ft. in length. However, larger parts can be made up by segmental construction. Care must be taken in selecting the wood to see that genuine lignum-vitae is obtained. There are several inferior woods similar in appearance but lacking the properties of the genuine article.

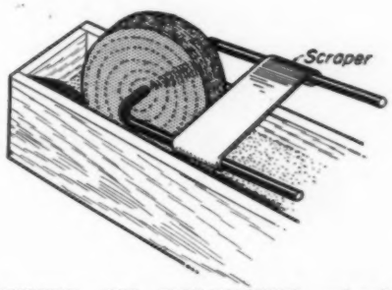
Short Cuts FOR THE SMALL SHOP

BY A. H. WAYCHOFF



DETACHABLE vise jaws are made by machinists for gripping a large variety of work shapes. Here is an idea for gripping a wide size range of rounds to be held vertically while cutting threads or running down nuts. Get two pieces of steel the same thickness as the vise jaws, cut one piece somewhat wider than the other. Cut a V notch in the narrow piece; shape a V projection on the wider one. And then cut a small V notch in the tip of the V-projection. To the blocks assemble clock spring clips that will hook over the vise jaws. Small rounds will enter the smaller V notch and be crowded to the bottom of the larger V; parts of larger diameter will be pressed into the large V by the points on the other block.

PARTS LIKE washers, nuts and screws are often kept in the original keg or barrel. And in reaching down into the container, wear and tear on clothing even skinned arms may result. To remedy the situation, split some old hose and slip over the rim of the container.



BUMPS ON POLISHING wheels can be avoided by this stunt. Make a yoke that will pass through the wheel center. Then take a piece of sheet metal and curl two edges so they slip over the legs of the yoke. In use, push the scraper lightly against the surface of the wheel while rolling the wheel in a trough filled with abrasive. A good even coating, without lumps, will be secured. Thus, there will be less trouble when putting wheels in service.

ROUND TABLE

Single-Track or Double-Track Mind?

"I'm not quite satisfied with my crib system, Al—too much unnecessary damage being done some of the tools. By the time it is discovered, there's no telling who is the guilty party."

"Isn't it the crib man's job to see that tools are returned in good condition?"

"I'll admit that, Al, but there is a limit on what the fellow can do when he is rushed for time."

"What do you mean, rushed?" asked Al, with a puzzled expression. "That's one of the easiest jobs in the shop!"

"It may be easy most of the time, but it gets mighty monotonous at times."

"All right, Ed, let's get back to the original problem—damage to tools. "Why can't Harry make an examination of the equipment as it is returned to the window?"

"He can, to a limited extent, Al," replied Ed, "but you know very well that such a job soon becomes routine most of the time and a lot can slip through unnoticed."

"Well, yes, it does," agreed Al, "I can readily see why a damaged tool could be passed through unnoticed. Why not have Harry put the things aside until later on when the rush period has spent itself? Then he can give 'em the onceover."

"All right, Al," replied Ed, happy to have one on his friend, "but how's the fellow going to remember who used which?"

"You've got a point there, Ed, but we can lick that one, I'm sure. Ah, I've got it! What do you say that we have Harry make out a slip with the user's name on it as he hands back the tool?"

"That won't do, Al; takes too much time—and 'sides, you'd have paper cluttering up the crib."

"Well, here's another—and I think you'll agree with this."

"Wonderful!" smiles Ed. "Shoot!"

"What say we have checks on a board inside the crib, Ed, and above the checks would be the name of the owner? Then, as soon as a tool is handed in, a check is immediately put on it until it has been inspected."

"That's going to put a lot of work on Harry."

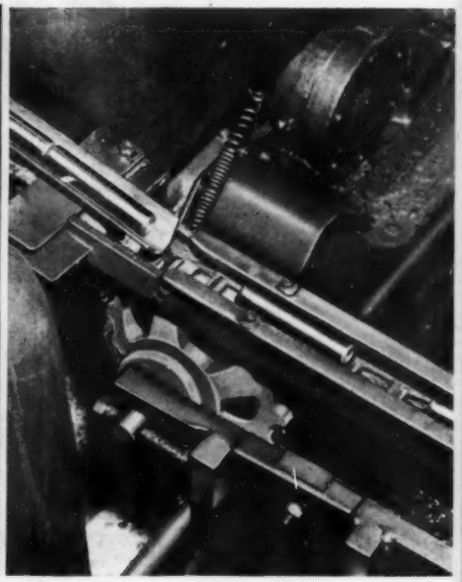
"That's going to wake him up and remove some of that monotony you referred to a few minutes back."

"Well, Al," smiled Ed, "I'll try out your scheme."

"The psychological effect of the check retention will be enormous, Ed—it'll keep the men on their toes to be more considerate with the tools."

***DOES A MAN** who handles and checks eventually do only the handling in most cases? In other words, have most workmen single-track minds? Your ideas and opinions on this subject—as well as this problem created by it—will help others. Discussions of earlier topics appear on later pages.*

Straight-line setup moves guides from grinder at far left, (not shown) through second grinder, washer, gaging and counting unit, and into box at right



Continuously moving chain conveys parts between guide rails from second grinder to washer

Valve-Stem Guides Finish Ground Automatically

BY R. R. COULETTE, General Superintendent
Indianapolis Works, Motor Truck Division
INTERNATIONAL HARVESTER COMPANY

CAST-IRON valve-stem guides are handled automatically through two centerless grinders and a special washing machine at the Indianapolis Works of International Harvester Company. Only one man operates this setup for grinding to within 0.0005 in. tolerance the thousands of guides needed daily in the manufacture of engines for International trucks.

Guides are semi-finish ground in the first grinder and finish ground to final size in the second. Parts move into the first machine from an automatic feed loaded by the operator. Passing from between the wheels of the first grinder work pushes previously finished parts along a trough to the wheels of the second machine. This trough is an angle section mounted so it can be positioned for workpieces of different diameters.

A similar trough receives guides from the second grinder and drops them onto a continuously moving chain conveyor. This carries the parts between guide rails into the washing machine where all surfaces are flushed with cleaning oil. The oil leaves a film on the guides to prevent rusting before delivery to engine assembly lines.

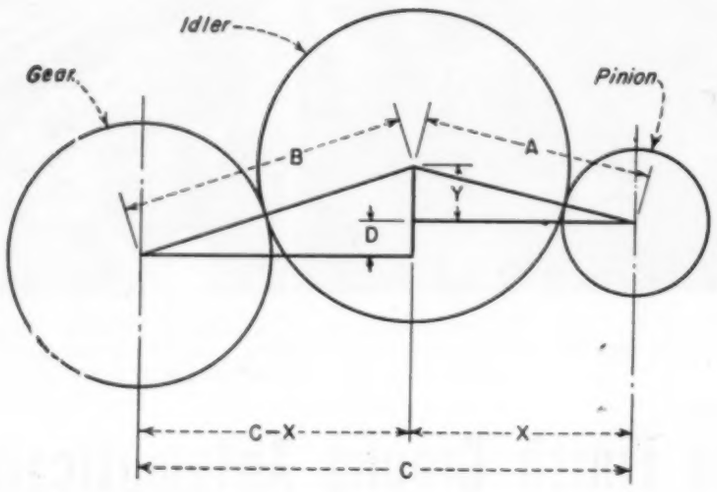
From the washer, parts are pushed by following pieces along a trough on the adjoining inspection shelf and through the gage ring of a Sheffield air-gaging unit. After gaging, the guides fall into a lift-truck container, striking the paddle of a counter as they drop. This gives an accurate piece count even when the inspector is away from the unit.

Because of the precision tolerances required, frequent checks of the accuracy of the gaging unit are made with a dial comparator mounted on the inspection shelf. Standard setting plugs are available for recalibrating the air gage when necessary.

Few rejects are produced, since except for loading parts into the hopper on the first machine the operator spends his time checking parts and keeping the grinders in adjustment to hold the tolerance.

Automatic flow of guides passes through gage ring of Precisionaire unit at inspection shelf. Inspector and grinder operator work as a team to keep production high

Practical Ideas



Mathematical Formula Locates Idler In Offset Gear-Pinion Mechanism

Spotting an idler of known pitch diameter in position in a gear-pinion train is no simple job. This is especially true if the pinion is offset from the horizontal coordinate of the gear, as in the drawing. But the use of a substitute constant for complicated expressions in a straightforward algebraic solution considerably reduces the effort in finding an equation that can be employed in all cases.

Known values are A, B, C and D—A and B being found by adding the radii of the gears to be worked with. The quantities X and Y, the coordinates of the idler gear, are to be found.

Starting with the two right triangles in the drawing:

$A^2 = X^2 + Y^2$, and

$B^2 = (Y+D)^2 + (C-X)^2$

Substituting the function of X in the first equation for X in the second:

$$B^2 = Y^2 + 2DY + D^2 + C^2 - 2C\sqrt{A^2 - Y^2} + A^2 - Y^2$$

$$2C\sqrt{A^2 - Y^2} = 2DY + D^2 - B^2 + C^2 + A^2$$

Substituting K for $A^2 - B^2 + C^2 + D^2$:

$$2C\sqrt{A^2 - Y^2} = 2DY + K$$

$$4C^2A^2 - 4C^2Y^2 = 4D^2Y^2 + 4KDY + K^2$$

$$4C^2Y^2 + 4D^2Y^2 + 4KDY + K^2 - 4A^2C^2 = 0$$

$$Y^2(4C^2 + 4D^2) + Y(4KD) + K^2 - 4A^2C^2 = 0$$

Using the binomial theorem for the solution of this quadratic equation for Y:

$$Y = \frac{-4KD \pm \sqrt{16K^2D^2 - 4(4C^2+4D^2)(K^2-4A^2C^2)}}{2(4C^2+4D^2)}$$

With further simplification (3 steps), the equation becomes:

$$Y = \frac{-KD \pm C\sqrt{4A^2C^2 + 4A^2D^2 - K^2}}{2(C^2+D^2)}$$

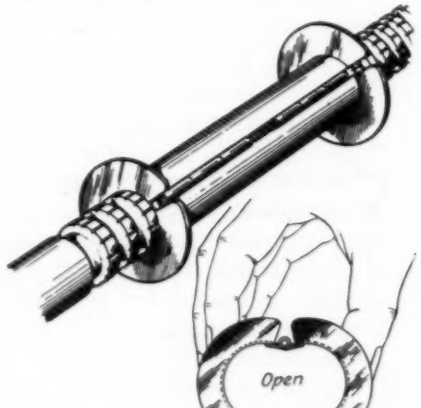
This equation may be employed in any case. If the pinion and gear are on the same horizontal coordinate, then D becomes zero and the formula is further simplified.

After Y is found, it can be substituted in the first equation to find X. *Henry L. Ahner, Flushing, L. I.*

Shims Check Chuck Shaving

Handling large, rough work on a magnetic chuck invariably means that the chuck takes an abnormal beating. Nicks and gouges can be nearly eliminated by placing thin metal shims under the work.

Grit is less easily picked up, and sharp corners are padded if steel shims, about 0.007 in. thick, are employed. The steel does not impair the holding qualities of the chuck, and its protection is much better than that of paper. *Rolland Stanford, Carthage Machine Company, Carthage, N. Y.*

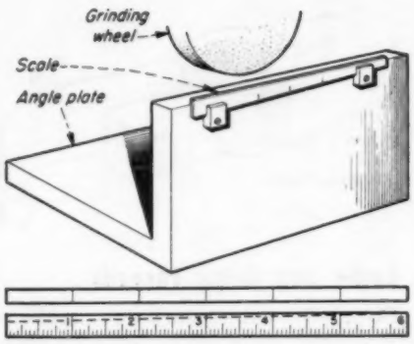


Broach Grip Protects Hands

Broaching-machine operators have found that light grips for use in handling broaches will save wear on gloves and hands. The circular grips are made of sheet aluminum, which is too soft to harm the broaching edges.

Two half-sections are made for each size of broach. These are hinged together with a light spring so they will separate when not being used. Flanges are turned up at the ends to prevent a hand slipping off.

The grips are especially useful when a long, slender broach must be supported while in use. *S. Lees, Hayes, England.*

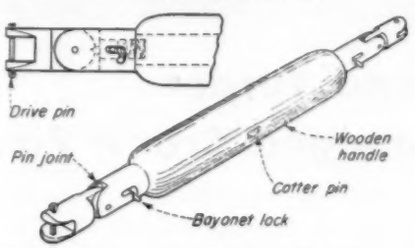


Angle Ground on 6-in. Scale Forms Tool for Gaging Slots

A high-precision gage for measuring the width of milled or shaped slots at a glance can be made from an inexpensive machinist's 6-in. scale.

For checking ¼-in. slots, the scale is first cut off on one edge to a width of 17/64 in. Then, with the scale tilted at an angle of 0°, 3 min., 27 sec., light passes are made with a cylindrical grinding wheel until the width at the 4-in. mark is exactly 0.250 in. The setup is shown in the illustration.

If the scale is machined with a good degree of precision, the scale readings between the inch marks can be translated into tenths. Since the scale is narrowest at the zero end, the depth to which the scale can be pushed into a ¼-in. slot indicates the width. Thus a depth of 3 in. indicates a width of 0.249 in. The same principle can be applied to any size of slot. *William A. Adams, Brooklyn, N. Y.*



Valve Driver Controls Lapping

Hand valve grinding, or lapping, can be more effectively done with this replacement for the commonly used screw driver. Two different sizes of valves can be ground with the device—one at each end.

The wooden handle is held to the metal shank by a cotter pin through both parts. Each end of the shank is drilled and slotted to admit the drive fitting and spring stop. A spring-loaded pin fits into the hole in the end of the shank—its tip fitting into a notch in the driver surface to hold it steady when it is not in operation. A bayonet pin and slot in the shank controls the positions of the pin.

The driver engages the valve through a pin in its end. In addition, the driver is pivoted to the shank through another pin, giving a universal joint effect to the driving action. Note the detail of the drawing.

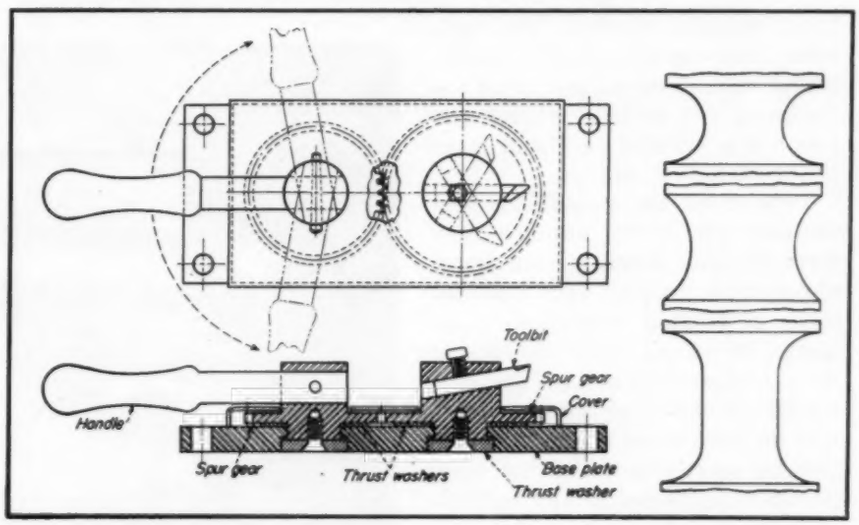
For a lapping job in which the driver must enter the valve bore, the drive pin can be cut off at its ends and soldered in place. The driver eliminates vertical side twist and slipping out of the slot—two disadvantages of using a screw driver. *Ralph R. Waech, Tacoma, Wash.*

Breaks Cut by Magnetizing Drills

Small drills, especially those under ⅛ in. dia., can be protected from jam breakage by being magnetized on a surface grinder. With the electro-magnet turned on, the drills are rolled on and pulled off the grinder chuck.

The treated drills are fed at their regular rate of speed, but are raised after every sixteenth or eighth is drilled to be brushed off. Brushing removes the chips, which cling to the drills.

Removing chips prevents jamming inside the holes, and therefore cuts down on the chances of the drills snapping. *Elgani Stump, Ft. Wayne, Ind.*

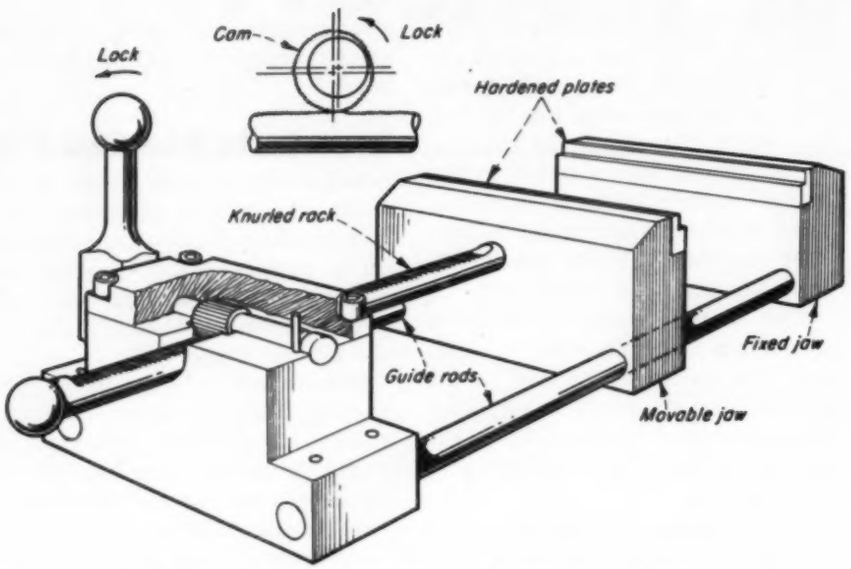


Double-Gear Screw-Machine Tool Turns External Radius on Shaft

Butt-welded shafts were necked with smooth arcs by the action of a shop-designed attachment to a hand screw machine. The tool took the place of a compound rest, which was not available for the machine.

Two simple spur gears provided the relative motion of the tool. These were machined with heavy hubs. The cutting tool was mounted in a slot in one hub, and was adjusted by a setscrew. The other hub was provided with a handle to make turning the gear-pair an easy job.

The basic design of the attachment can be easily altered to permit larger or smaller arcs being turned. A clamping arrangement can also be added to allow the tool to turn straight shaft sections, as illustrated in the lower work sample. A cover plate kept chips from the gears. *Theodore Oshinsly, Brooklyn, N. Y.*



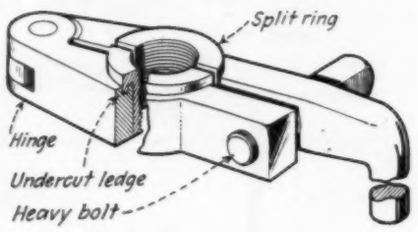
Knurled Cam and Rack Built Into Quick-Acting Machine-Shop Vise

Light machine work in the toolroom can be speeded by this quick-acting vise. Used primarily at the drillpress and surface grinder, the vise has a knurled rack and lever for its clamping motion.

Tension in the guide rods and compression in the knurled rack force the jaws closed. A short shaft mounting a knurled cam (see detail) is located inside the rear block. When the handle is rotated to a horizontal position the cam forces the rack forward and tightens on the work. Since the cam can be rotated to clear the rack, it can be engaged in any position along the rack.

Dowel pins are employed to hold mating parts together. Both ends of the two guide rods are doweled inside the vise blocks. The moving jaw is free to slide along the rods.

The cover and base of the rear block have been recessed to take the short, cam-carrying shaft, which is pivoted in the end pieces of the block assembly. After the moving jaw has been located approximately, the work can be adjusted before the jaws are clamped. The low pitch of the knurl and the small diameter (⅝ in.) of the cam combine to give fine adjustment of the vise setting. *Allen B. Nixon, Springfield, Mass.*

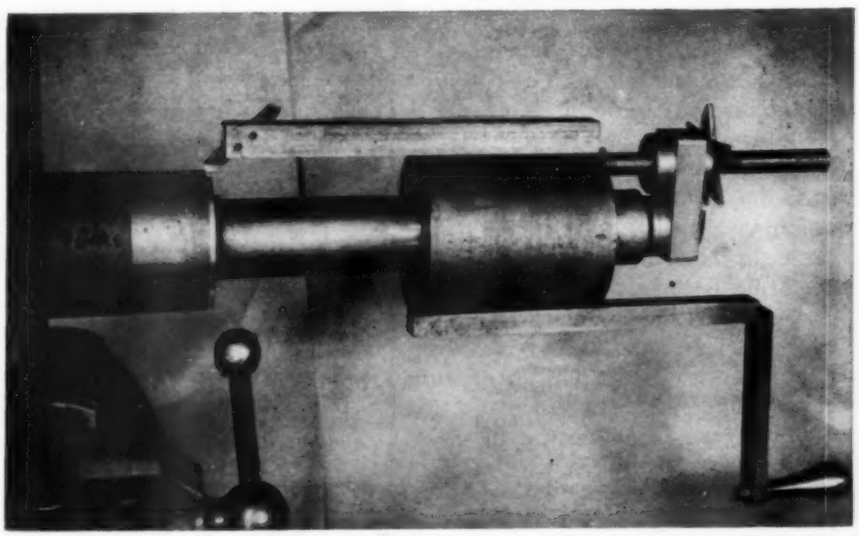


Lathe Dog Grips Threads

Coupled with various sizes of threaded split rings, this dog can be clamped on finished thread work for subsequent lathe operations.

Turned from brass or bronze, the nuts are held in place by the undercut ledge in both dog and ring. A heavy hinge and stout tightening bolt clamp the dog.

Rings ranging in capacity up to an inch, with standard threads, are easily made as they are needed. *John Homewood, Ontario, Cal.*



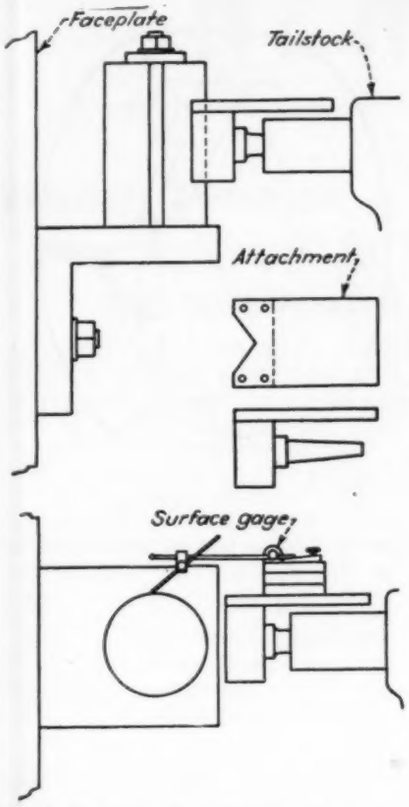
Engine-Mounted Hand Turner Trues Up Damaged Crank Pins

Out-of-round crank pins on steam engines are difficult to remove for turning down to round. Instead of going through the lengthy process in our shop we use a hand turner that can be set up on the engine.

First the connecting rod is removed, and then the turner is mounted on the damaged pin. The shank of the turner is screwed into the center hole of the pin.

The turner consists of a main shank, a large bronze cylinder riding on the shank, and a cutting tool mounted on the cylinder. Turned counter-clockwise by the handle, the turner duplicates the action of a lathe.

Feed is accomplished by a star-wheel arrangement mounted on a large screw in back of the cylinder. The photograph shows a test setup on a bench. *John T. Zurlo, Champlain, N. Y.*



Angle-Plate Setup Speeded By Work-Aligning Attachment

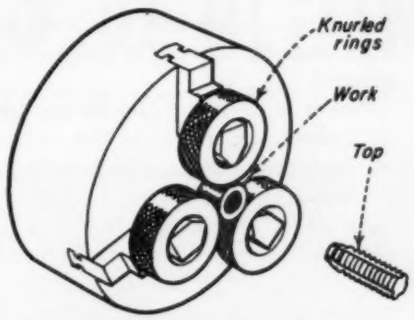
The setup of a piece of round stock to be drilled crosswise can take a lot of time. Using this V-block-table combination may reduce the time in most cases.

A plain V-block is drilled and fitted with a tapered shank. A piece of flat stock bolted to the end of the block forms a table that is perpendicular to the V. The table is cut out to the profile of the block.

The dual-purpose fixture can be used in a number of ways—two are illustrated. The upper view shows use of the block for locating the round stock approximately before final tightening. The lower view shows use of a surface gage on the table to make location exact.

The fixture can be used equally well for aligning square or rectangular stock. Line contact of the block edges against any parallel-sided stock will square it up for drilling.

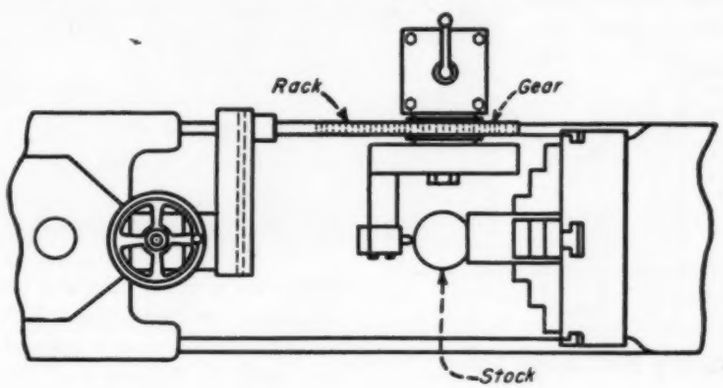
The standard taper of the shank allows it to be used with most tailstocks. *H. Moore, Kirkstall, Leeds, England*

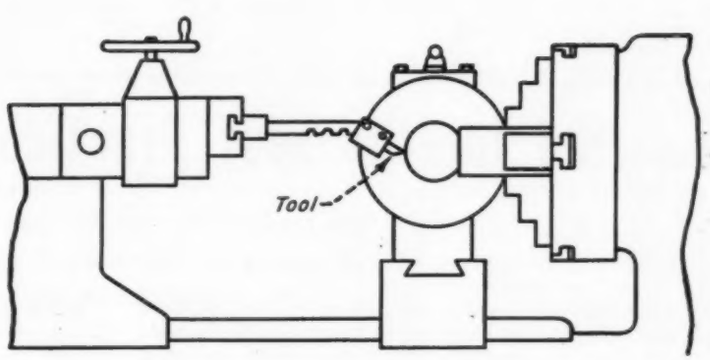


Knurled Rings Hold Drill Job

Drilling and tapping an externally-knurled part was practically an impossible job. The external diameter was ¼ in., and the hole was to be tapped with a No. 12 tap—making the walls only about 0.012 in. thick.

Three knurled rings, made with the same knurl as the part, were mounted in the chuck over the jaws. The chuck was then closed lightly on the part and drilling and tapping was done. The light pressure on the part eliminated distortion, and the knurled rings held the part from slipping. *R. B. Ware, N. Quincy, Mass.*



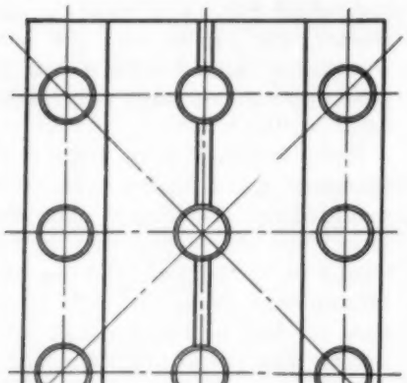


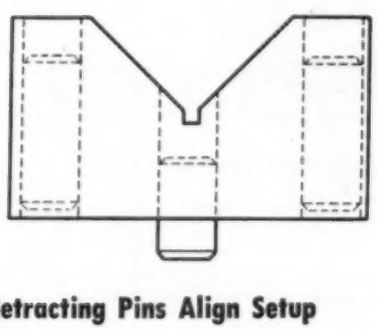
Ball-Turning Lathe Attachment Cuts Hand Feed, Raises Speed

Ball turning is done most successfully in our shop by using the power feed of a turret lathe to revolve the tool in a direction at right angles to the rotation of the work. By having machine power for both motions, accuracy and speed are high.

Work is chucked in the machine head. A shaft mounted to revolve freely on the cross-sliding turret carries a spur gear and a bar. The toolholder is bolted to the bar in position for turning the ball.

Traversing motion of the turret is transferred to the gear-engaging rack by a T-slot holder. The arrangement allows the cross-slide and rack to be moved back out of the center of the lathe for insertion of new stock. *Walter Milewski, Chicago, Ill.*





Retracting Pins Align Setup

Saving setup time is a certainty if a standard V-block is drilled with nine holes in three rows. Pins are light press-fitted into the holes so they may be moved in and out as desired.

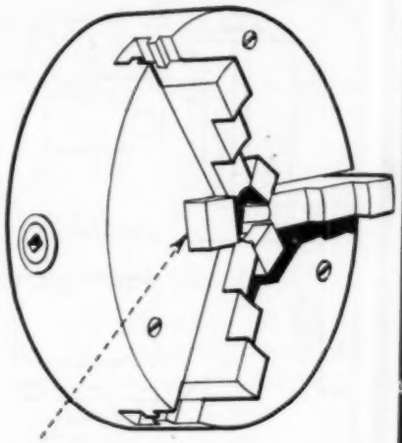
For a lathe setup the center pin is pushed out to locate the center of the block. On a milling machine or shaper two pins in a row are extended to locate the V in alignment with or perpendicular to the line of feed. If the corner holes are located in a line at 45° to the V, quartering setups are possible.

Extended pins are dropped into T-slots or can be dropped over the edge of a machine table. Accuracy of hole location controls the accuracy of setup. *L. Kasper, Philadelphia, Pa.*

Chuck Jaws Ground True

There are serious disadvantages to the conventional methods of grinding the faces of universal-chuck jaws. When the jaws are clamped down on a small ring the job must be done in two parts. The front edges of the jaws are ground—then the ring is shifted and the back edges are ground. This often results in a step ground in the jaw.

Backing the jaws out against a large ring is not accurate because of the variation in backlash between the directions of travel of the jaws. Three small blocks of steel can be chucked between the jaws to do the work of the small ring and yet keep out of the way of a full grinding stroke. Size is controlled by the radius desired.



The blocks are kept back of the edges of the chuck jaws and rest on the parallel sides of two adjacent jaws. *Chris Sorenson, Racine, Wis.*

NOW...$25 for the best Practical Idea in each issue

(in addition to regular payment for all exclusive contributions published)

An extra payment of $25 will be made for the best Practical Idea in each number of *American Machinist*. To avoid bias, the selection will be made by readers, a different group each time.

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Judges—A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, will hereafter select the best Practical Idea. If at any time their votes result in tie, $25 will be paid to each and every co-winner. The decision of the readers will be final in each case.

Requirements—Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer or author—every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product — in terms of its usefulness to them.

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How to Enter—Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42nd St., New York 18, N. Y.

53rd Selection — Frederick C. Lurz's Turning on a Mill

NEWS OF METALWORKING

Export Question Clarified by U.S. Aid to Finland

WASHINGTON — Recent licensing of industrial goods to Finland does not represent a new policy on exports to Eastern Europe, but it is concrete expression of existing U.S. policy on such trade.

What the administration in general, and the Commerce Dept. in particular, are trying to do is steer a safe course through a difficult political sea. Europe must be helped and yet potential war material must not find its way into Russian hands. The action on Finland represents the first try to accomplish this.

The official release mentioned $3,890,000 of industrial goods: power generator parts, machine tools, steel products, etc., needed chiefly for developing Finland's timber industry. But there were other goods involved. One other category includes $500,000 of paper machinery and others will be known within a short time.

The action on Finland was a deliberate one. Western Europe needs timber, for one thing; and the Marshall Plan is based on expansion of East-West trade. For another, the machinery should help Finland to pay its reparations obligations to Russia, because, if she defaults, pressure on her would increase and might even be taken as an excuse for an overt act.

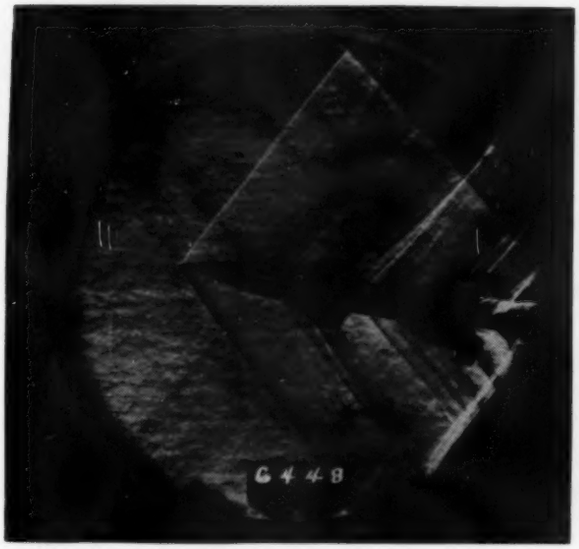
Finns Held Friends

Then there is the belief that the Finns are more our friends than they are the Russians and that we should try to help them if at all possible.

As the special licensing committee begins to make other decisions, there will likely be fireworks.

For example: Poland needs coal mining machinery, which could be considered a war potential. Yet, the Marshall Plan is counting on increasing quantities of Polish coal for Western Europe. The coal mining machinery can boost production. Chances are the administration will approve such a shipment.

Czechoslovakia is another case in point. It may well receive special treatment too. It is a member of the International Trade Organization and one of the 23 countries which signed the Geneva trade agreements, and its East-West Trade has always been important.



SHOCK WAVES on a model of a guided missile at supersonic speeds can be seen when photographed by the Schlieren camera during tests in supersonic wind tunnel. This test is being made in the new flexible - throat supersonic tunnel (AM—June 3, '48) at Aberdeen Proving Ground

Czechs Need Machinery

Czechoslovakia needs machinery of all kinds to expand production. In turn, it can send textiles, foundry products, rolling stock, footwear, timers, technical porcelain, specialty-types coal, and even some food, to the countries of Western Europe. The inter-agency will lean over backwards to prevent obvious war-potential stuff from going through, machinery especially, but some machines and equipment should be getting the green light from time to time.

As an approach to licensing it has been stated that all U.S. exports would be judged roughly as follows:

Three Groups Listed

(1) Those that are clearly of no direct aid to Eastern Europe's war-making ability. For this group, it was said, an application to export has every chance of getting through. This statement was backed by OIT's bulletin exempting from licensing shipments to Europe of scores of "safe" commodities: meat products, vegetables, fruits, spices, sugar, beverages, sawmill products, paper-base stock, kitchenware, flashlights, staplers, sprayers and dusters for farming, vitamins, movie film, sporting equipment.

(2) Those that are clearly war materials—aircraft engines, military explosives, radioactive materials, etc. These will not have a chance.

(3) Those that occupy a sort of "twilight zone," best exemplified by machinery, machine tools, transportation equipment, etc.

This is the stuff which will bear the brunt of case-by-case study by the special inter-agency group. Up to this point it has been difficult. That is illustrated by the complaints of certain machinery manufacturers —specifically makers of metalworking equipment — who can't get licenses to ship against contracts to the Soviet Union.

German Machines to NZ

MELBOURNE (McGraw-Hill World News)—First of 1407 machine tools from Germany have arrived in New Zealand. This shipment under the reparations agreement contained 150 units built between 1938 and 1944 by such firms as Atlas, V.D.F., and Stenzel. Engineers who inspected the shipment said there was no evidence of skimping in materials or workmanship. Already 82 machines have been placed for a return of about $100,000.

The minimum of 1407 (New Zealand hopes for 2000) will include 117 milling machines, 298 lathes, 180 presses, 100 grinders, 236 drilling machines, 71 saws, and 52 planers.

General Motors Cost-of-Living Plan Unlikely to Be General Wage Pattern

WASHINGTON — Most unions and employers negotiating third-round wage demands hesitated to bite on the cost-of-living escalator formula adopted by General Motors and the two CIO auto and electrical workers unions.

Ten days after the GM settlement there was little prospect that the formula would become a general pattern in the metalworking or other industries.

There was no question, however, that a break had occurred in management's resistance to a third round of wage boosts through the 11¢ settlement in GM and the 13¢ increase granted by Chrysler to end a three-week strike. Major negotiations being watched were those of Westinghouse and General Electric with the CIO electrical workers. Talks were to begin at Ford.

Two reasons for union resistance: (1) The 1940 base in the GM formula is unsatisfactory for most unions because since 1940 wage rates in their industries have risen higher than the cost of living. Bethlehem Steel, for instance, replied to the CIO shipbuilding union's approval of the formula with the observation that if it were applied to shipyard wage rates, it would result in a 10c wage cut. Since 1940, the company said, shipyard rates have risen 82% compared with a 69% rise in the cost of living; and (2) The formula commits the union to wage cuts.

Management, too, shied away from the formula because, although there is a floor on wage cuts, there is no limit to the amount of increase if living costs continue to rise.

In Congress, both liberal and conservative members criticized the principle of tying wages to living costs. Sen. Taft said it tended to speed up both inflationary and deflationary spirals. Chairman Wolcott of the House Banking and Currency Committee saw he formula as destroying the stabilizing influence of consumer resistance to rising prices. Sen. Morse called it economically unsound.

Union-Shop Fracas On Three Fronts

WASHINGTON — The union-shop issue has broken out anew in all three branches of government.

In Congress, the Senate-House ("watchdog") committee on the Taft-Hartley law has been holding hearings on dropping the rule that employees must first vote approval of a union shop before the union can seek this concession from management. Few people expect any action on this at the current session, however.

NLRB has decided, by a 3-2 vote, that it will not conduct union shop elections in 13 states which have outlawed the closed shop and its lesser forms. The states: Arizona, Arkansas, Florida, Georgia, Iowa, Maine, Nebraska, North Carolina, North Dakota, South Dakota, Tennessee, Texas, and Virginia.

Six other states (Wisconsin, Colorado, Kansas, Delaware, Massachusetts, and New Hampshire) regulate compulsory unionism. In these states NLRB will conduct union-shop elections if they do not conflict with state law.

Meantime the Supreme Court agreed to rule on the validity of the anti-closed shop constitutional amendment adopted in Nebraska in 1946. This is the third such state provision appealed by AFL which the court has agreed to review.

The others are an Arizona constitutional amendment and a North Carolina statute, both of which ban compulsory union membership. State courts have upheld all three bans.

The Nebraska test involves the Northwestern Iron & Metal Co. in Lincoln. The AFL demanded that an employee be discharged, in accordance with a closed-shop contract, for non-payment of union dues. The company refused, contending that the constitutional amendment made that part of the contract illegal.

T-H Deadline Nears

WASHINGTON — Beginning July 1, employers cannot deduct a worker's union dues, fees, or assessments from pay without his voluntary consent in writing. The deadline was earlier in cases where contracts have expired since last June. Penalty for violation of this Taft-Hartley provision is stiff: as much as $10,000 fine and a year in jail for both employer and union official.

***LARGE CLOCK**, designed like a milling cutter, presented by employees to Kearney & Trecker on its 50th anniversary. K & T has a substantial backlog of orders and is in the strongest financial position in its history*

Bliss Toledo Plant Gets Face Lifting

TOLEDO—Results of a $1,250,000 modernization program at the E. W. Bliss plant here were shown May 28 to executives of mid-west firms making sheet-metal products. About $900,000 of the investment went into large turret lathes, planers, boring mills, and gear-cutting equipment, according to Marshall M. Smith, president of Bliss.

The Toledo division is known locally as the Toledo Machine and Tool Co. Plant expansion here is part of a company-wide program resulting from the decision to cease operations at Brooklyn, N. Y., in order to serve the mid-west more economically. Similar programs have been completed at plants in Salem, Ohio, and Hastings, Michigan.

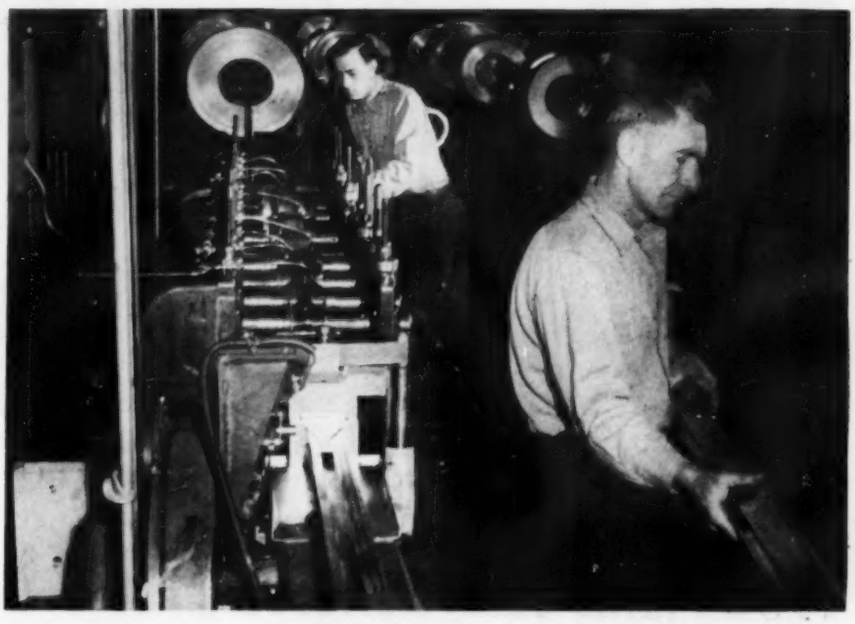
Detroit

QUIET LABOR FRONT INDICATES UNINTERRUPTED OUTPUT IN AUTO INDUSTRY . . . STEEL KEY TO RECORD PRODUCTION

General Motors Corp.'s cost-of-living wage raise formula, and the Chrysler Corp. strike settlement which followed, have combined to improve immeasurably the outlook for labor peace in the automotive industry. General opinion now is that the industry—including its major suppliers—is in for a year or so of uninterrupted production, bounded solely by availability of steel.

Parts suppliers and others have begun negotiations with the C.I.O. United Auto Workers Union and other labor organizations hemmed in pretty well by the extremes of the two settlements—raises in line with increased living costs, or flat raises at a maximum of the 13¢ granted by Chrysler.

The most hopeful aspect of the situation is that for once and for all the pattern idea seems to be dying. Companies are going to make settlements on their own, in line with their particular situations. This, incidentally, was one of the ideas General Motors had in proposing a cost-of-living settlement: that the variety of agreements reached under it would destroy the pattern idea.



SPECIALLY-DEVELOPED roll forming machine turns out aluminum flashing for home construction at Permanente Metals Corp.'s Trentwood, Calif., plant

Steel Situation Aided

The Chrysler strike served to help the forward outlook in one particular. Steel shipments to that company, too far along to be shifted in any noticeable degree for the short period of the tieup, continued in fair volume. As a result, Chrysler is expected to be able to make up a good share of the manufacturing volume lost during the walkout. The corporation's parts inventories did not change in that period, incidentally; suppliers received stop orders the minute the men went out.

Thus far this year, up to the start of June, automobile production has come to approximately 2,170,000 units, counting cars and trucks produced in U.S. and Canadian plants.

From here forward the total can be expected to improve. For one thing, Ford is getting back toward volume output after its changeover shutdown; and Chrysler will be running stronger. A June total of 450,000 would not be surprising, winding up the first half of the year with more than 2,600,000 assemblies.

Thereafter, the major barriers in the way of uninterrupted output will be the model changeover shutdowns in Chrysler and General Motors, indicated now for the fourth quarter, possibly the last portion of the third. Even figuring them in, however, the last half of the year should see at least as many cars produced as in the first half. With any kind of relief in sheet steel (which some authorities expect to come about by lessening of demand from the electrical appliance industry) the auto industry has a fair chance of cracking the 5.6-million record set in 1929.

Two Plants Opened

Two plant openings of note came this month. At Doraville, near Atlanta, Ga., General Motors opened its new Buick-Olds-Pontiac assembly division on June 15. Shortly before that date the Lincoln-Mercury division of Ford had the traditional opening ceremonies at its Metuchen (N.J.) plant.

Packard has gone into a new program of significance to machine tool suppliers. It has announced the opening of a new automatic transmission division, to operate under the direction of E. G. Patzkowsky, former industrial relations manager and wartime superintendent of the Rolls-Royce engine gear plant. Patzkowsky will handle engineering releases for the transmission, form an organization, acquire needed machinery, tool it up, and put the job in production.

For competitive reasons Packard is saying nothing beyond that. But well-grounded sources in Detroit heard that the entire machinery buying program might run upwards of $5-million, which will put it in definitely respectable class. Further indications were that the plant would be ready to install automatic transmissions as optionals on 1949 models.

Ford Testing Automatic Shift

On the score of automatic transmissions, Ford is understood to be testing one, developed by its own people. It is expected to be in the "bug-free" stage within a year or so, which would seem to position it for the 1950 models but not sooner.

The machine tool community is also interested in reports reaching Detroit from South Bend that Studebaker Corp. is placing orders of note for stamping press equipment. The indication is that the South Bend entry in the auto business will make more, if not all, of its body stampings sometime in the future.

Car Plants Boost West Coast Output

SAN FRANCISCO—Recent addition of plants by Ford and Chrysler have brought California's capacity to nearly 3000 cars and trucks daily. Now being assembled in this state are Buick, Chevrolet, Dodge, Ford, Lincoln, Mercury, Oldsmobile, Plymouth, Pontiac, Studebaker, and Willys cars; and Chevrolet, Dodge, and Ford trucks. Chrysler, DeSoto, and Nash cars go into production later this year.

***SLUDGE-FREE** coolant is supplied to 26 machines at the Black & Decker plant in Towson, Md., through a Hoffman vacuum filter system, reducing grinding costs and improving quality. One of the centerless grinders serviced by this system is shown at left. The filter is shown on the right*

1900 Plants Built, Restored Since War, Russia Reports; Steel Pushed

(McGraw-Hill World News)

MOSCOW—Nineteen hundred Soviet enterprises were built and restored during the first two postwar years and more than that number are called for under the 1948 program, A. S. Vishnevsky, vice minister of Heavy Industrial Construction Works, reported recently.

The state budget for 1948, now termed the decisive year of the current Five-Year Plan in four year, earmarked 60,900 million rubles for capital construction works, a high percentage of which is in the field of heavy industry. The most important heavy industrial construction works were described by Vishnevsky as being largely in expansion of steel production and allied industries. He pointed to the following projects on which work is scheduled for completion this year.

Prewar Levels Seen

The southern steel making capacity is scheduled to reach prewar levels at the restored mills in Zaporozhye, on the Azov Sea, in Makeevka, Stalingrad, and Krivoi-rog. At Zaporozhye construction is proceeding on six open hearths, the first of which came into operation March 10, and will make it possible for the Zaporozhye continuous strip rolling mills to produce sheet metal for automobile bodies from the plant's own smelted steel. Open hearth capacity is being rapidly restored also at the Makeevka, Enakievo and other southern steel mills that were demolished during the war.

At the Azov steel works the Soviet Union's largest rail and structural mill is under construction. Its main shops scheduled for completion by August this year will extend almost two-thirds of a mile in length. The restored blast and open hearth furnaces at the Azov mill are already producing pig iron and steel. The plant's production cycle will be completed when from its own steel rails, beams and channel bars are rolled for use in Soviet railway transport.

Construction work has been speeded up at the new metallurgical plant being built in the transcaucasian republic of Georgia. The plant's thermal electric station, open hearth and blooming mill are scheduled to be opened this year. At the Nikopol seamless tube mill new shops are to be completed for output of small-diameter piping. The tube-rolling mills at the Dniepropetrovsk steel plant are also being restored this year.

Blooming Mill Operating

In the Urals industrial bastion, major construction work is going on at the Magnitogorsk, Novo-Tagil and Chelyabinsk metallurgical plants. The country's second largest rail and structural mill is being built at Novo-Tagil, where the blooming mill was put into operation at the end of last year. Work now centers on construction of the rail and structural steel rolling mill itself. Mill "900" is being assembled, with installation of the 75-ton crane nearing completion. The building is being erected for the "800" mill which weighs 14,000 tons. A new coke battery is nearing completion at the Chelyabinsk metallurgical plant which was built during the war. Construction workers are now turning major attention to erection of open hearths, thermal electric station and a blooming mill. At Magnitogorsk the expansion schedule has been stepped up.

Tractor Plants Progressing

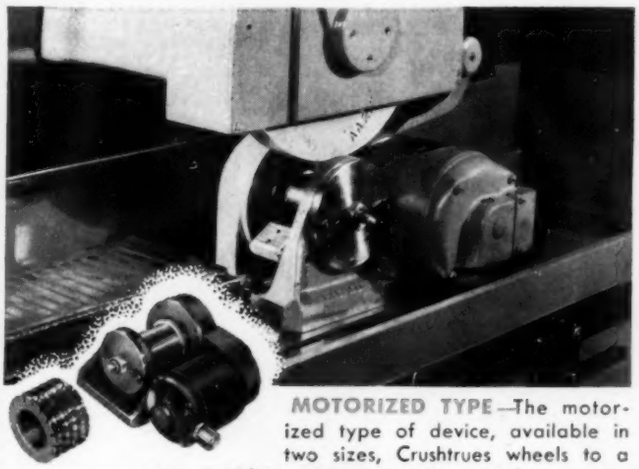
This year Soviet construction workers plan to complete restoration and construction of tractor plants at Stalingrad, Kharkov, Lipetsk and Vladimir. Construction of the foundry and parts producing shops is proceeding at the Vladimir factory which produces tractor cultivators. New engine and parts shops are being built at the Lipetsk factory which produces caterpillar Diesel tractors.

In the line of new construction methods being employed the workers engaged in restoration of the Zaporozhye steel mill have for the first time here applied welding instead of riveting in erecting the housing of the plant's blast furnace. The method is said to have speeded up assembly of structural steel, economized metal and reduced construction costs.

The heavy industrial construction program also includes the building of 1,400,000 square meters of new housing for steel workers, miners, machine-builders, chemists and building workers themselves. This also is part of the Five-Year Plan

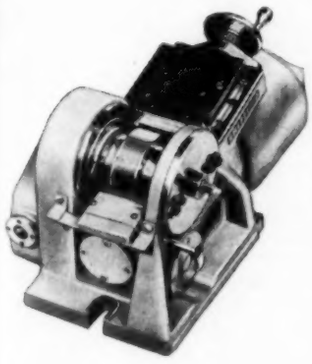
Speed jobs like these ON YOUR SURFACE GRINDER

Production and toolroom forms for flat work including form tools, punch and die sections and similar work, can be ground by a Crushtrued wheel on any standard surface grinder equipped with one of these Crushtrue Devices. In this way, the many advantages of Crushtrue grinding, including its speed, accuracy and marked economy, can be utilized with a minimum of outlay for tooling. There are three general types of Crushtrue Devices.



MOTORIZED TYPE—The motorized type of device, available in two sizes, Crushtrues wheels to a width of 3⅛" and is generally used for quantity production operations.

IDLER TYPE—The idler type is also available in two sizes. The smaller is used on grinders employing wheels up to 1" face. The larger utilizes wheels up to 3⅛" face. The units are generally used on grinders which have a slow speed spindle drive (approximately 300 fpm).



SELF-TRUING TYPE

The self-truing type is engineered especially for producing parts which must be held to a very high degree of uniformity. It incorporates a flat carbide form tool which is used to periodically reform the cast iron Crushtrue Roll without removing the roll from its mounting.

CRUSHTRUE ROLLS

Sheffield is prepared to regrind promptly, any. Crushtrue Roll after it has become sufficiently worn in service. In addition to that, a large stock of standard rolls is maintained for immediate delivery or in exchange for rolls sent in to be reground. The Bank includes all Standard U.S. threads from 8 to 32 pitch inclusive.

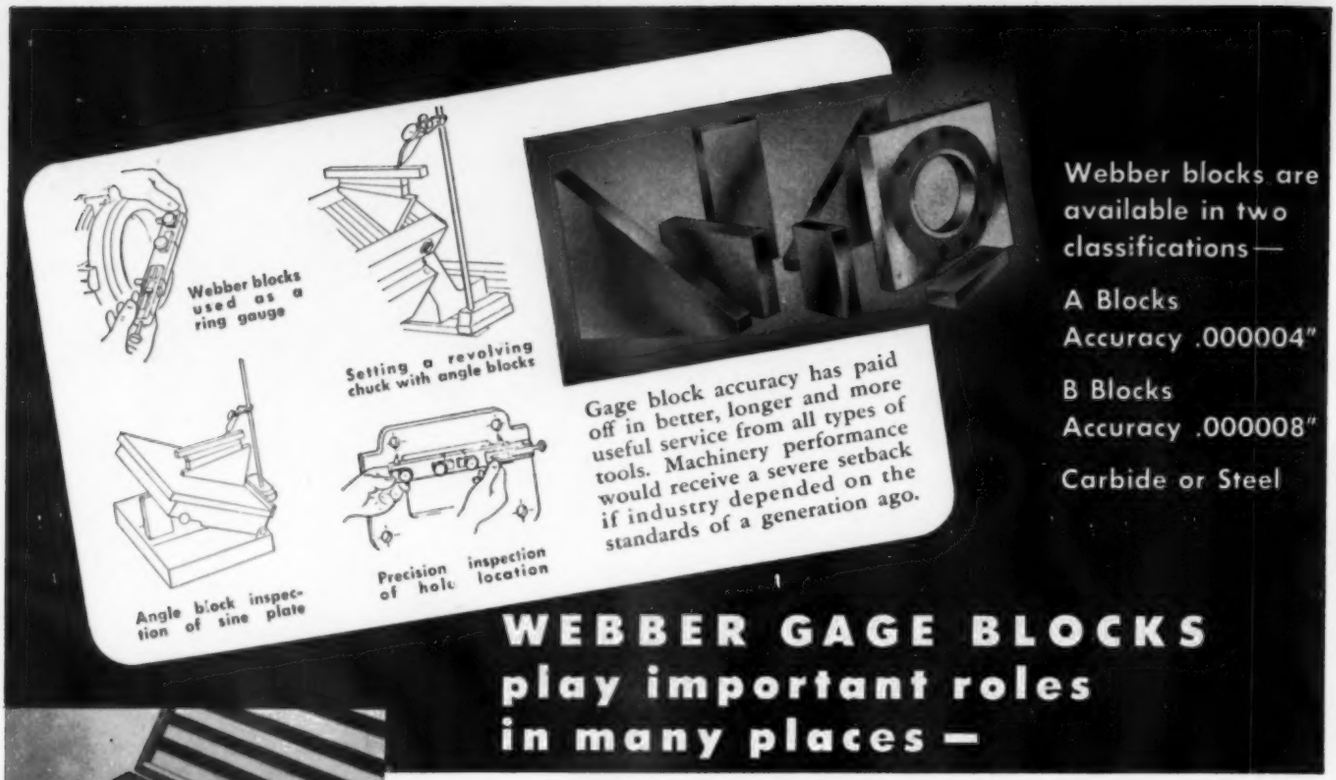
Sheffield **would like to send you new literature describing Crushtrue grinding and its outstanding economic advantages.**

Thread and Form Grinders
Microform and Visualform Grinders
Gear Chamfering
Burring and Burnishing Machines
Crushtrue Rolls and Fixtures
Special Machine Tools

MASTER CRAFTSMEN SHEFFIELD HEADQUARTERS

the *Sheffield* corporation
Dayton 1, Ohio, U. S. A.

2982


Webber blocks used as a ring gauge
Setting a revolving chuck with angle blocks
Angle block inspection of sine plate
Precision inspection of hole location
Gage block accuracy has paid off in better, longer and more useful service from all types of tools. Machinery performance would receive a severe setback if industry depended on the standards of a generation ago.
Webber blocks are available in two classifications—
A Blocks
Accuracy .000004"
B Blocks
Accuracy .000008"
Carbide or Steel

WEBBER GAGE BLOCKS play important roles in many places—

84B Accuracy: .000008"
84 block set $195.00

Angle Gage Blocks increase speed and precision of angle inspection.

Carblox Wear Gages add the wearing qualities of carbide to any standard steel gage block set.

Today the smallest shop knows that tools last longer, rejects are less and profits go up when work is constantly policed with gage blocks.

Imagine how long an automobile would last if its tolerances were reduced by a few thousandths of an inch, or how the hazards of airplane travel would increase.

Webber has advanced the art of gage block making to a point where blocks can be placed on every bench or machine at comparatively low cost. Write to Webber, ask for latest folders on special gage block applications.

WEBBER GAGE COMPANY
12907 Triskett Rd., Cleveland 11, Ohio

These are the direct factory representatives who can tell you about the advances in precision measurement made possible by Webber know-how.

"Cleveland Area"
HUGH G. COLLINS
12900 Triskett Rd.
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Clearwater 1200

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35 E. Wacker Drive
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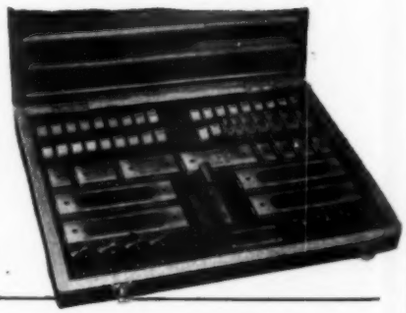
Central 0375

Webber
MICRO-ACCURATE GAGE BLOCKS and FIXTURES



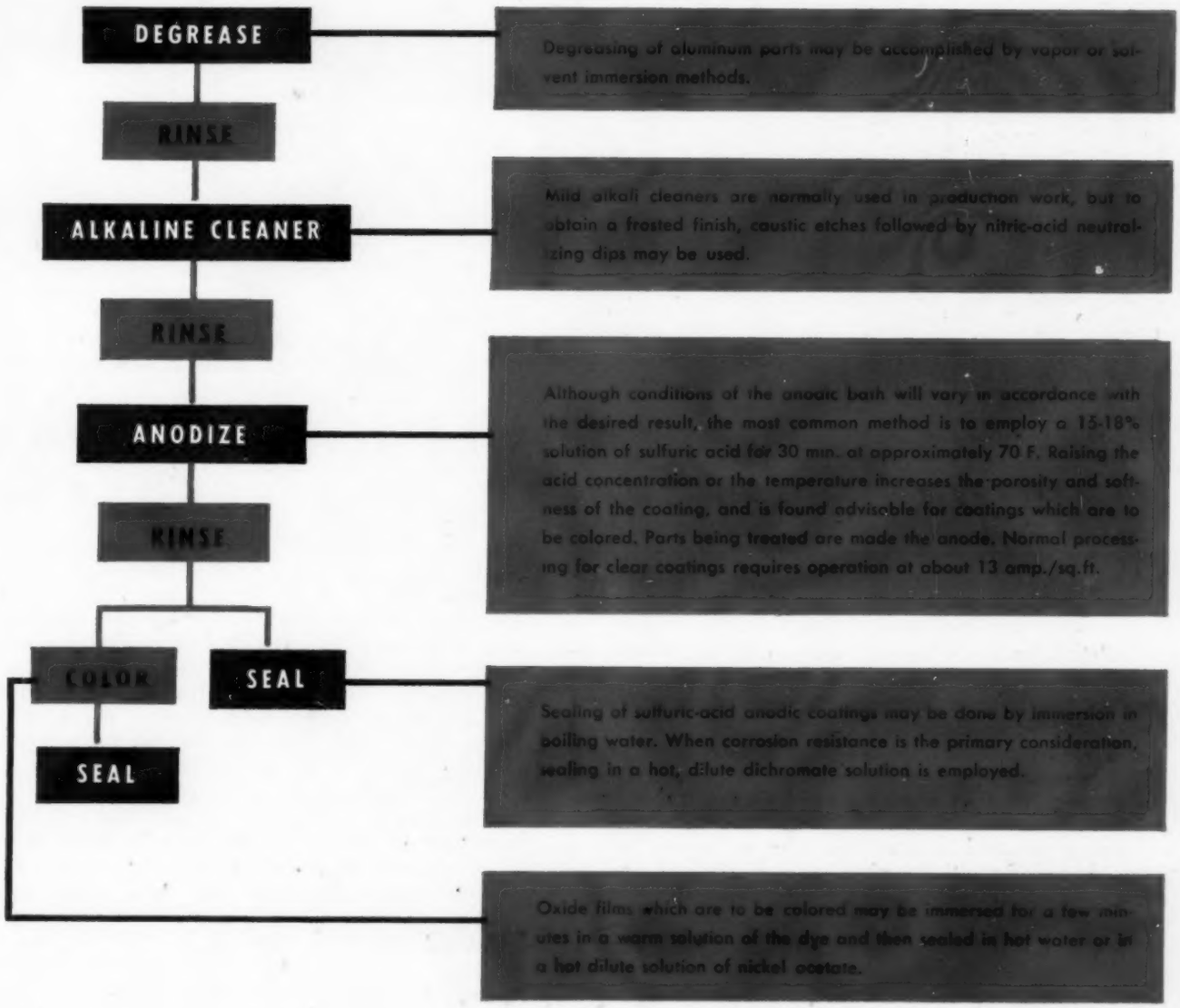
Transferring the extreme precision of gage blocks to the work without time taking precautions is one of the outstanding advantages of Webber Heavy Duty Gage Blocks and Fixtures.

Process Sheet For Anodizing Aluminum

Alumilite Sulfuric-Acid Method

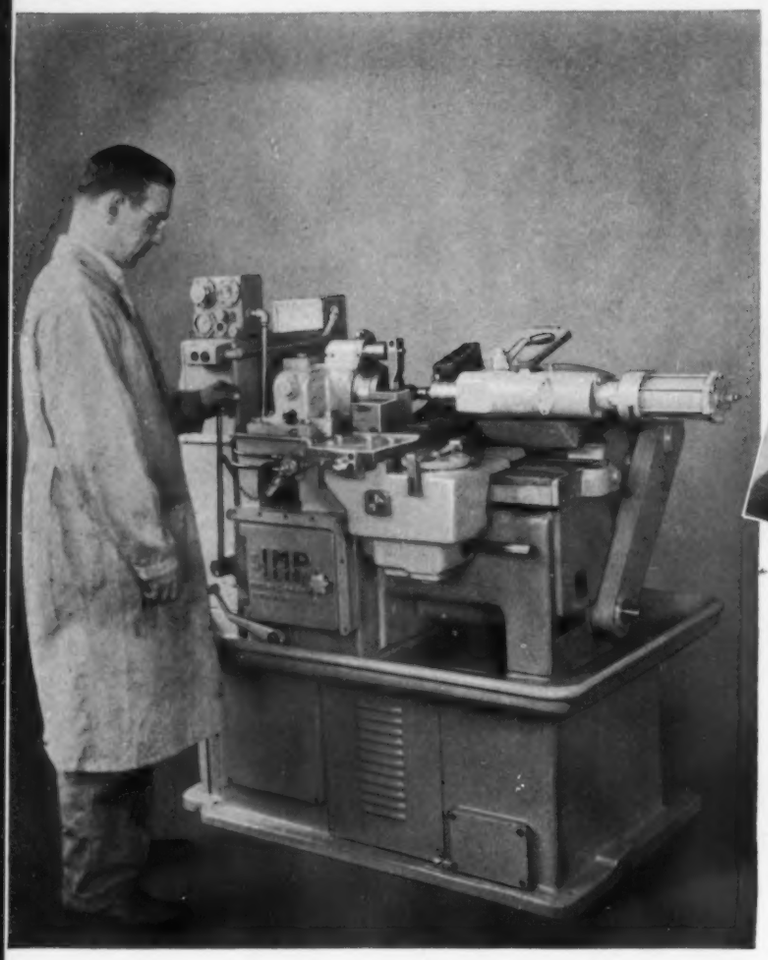
BY GEORGE BLACK

The sulfuric-acid anodic process is widely used in this country and abroad for the production of a hard, attractive, corrosion-resistant oxide film on aluminum and its alloys. It is suitable for all the alloys of aluminum used commercially and may be applied over a rather wide range of thickness and hardness. As applied under patents held by the Aluminum Company of America, this process, known as the Alumilite process, is extensively used on a long list of consumer items and is available in clear as well as in beautifully colored coatings.


DEGREASE
Degreasing of aluminum parts may be accomplished by vapor or solvent immersion methods.
RINSE
ALKALINE CLEANER
Mild alkali cleaners are normally used in production work, but to obtain a frosted finish, caustic etches followed by nitric-acid neutralizing dips may be used.
RINSE
ANODIZE
Although conditions of the anodic bath will vary in accordance with the desired result, the most common method is to employ a 15-18% solution of sulfuric acid for 30 min. at approximately 70 F. Raising the acid concentration or the temperature increases the porosity and softness of the coating, and is found advisable for coatings which are to be colored. Parts being treated are made the anode. Normal processing for clear coatings requires operation at about 13 amp./sq.ft.
RINSE
COLOR
SEAL
Sealing of sulfuric-acid anodic coatings may be done by immersion in boiling water. When corrosion resistance is the primary consideration, sealing in a hot, dilute dichromate solution is employed.
SEAL
Oxide films which are to be colored may be immersed for a few minutes in a warm solution of the dye and then sealed in hot water or in a hot dilute solution of nickel acetate.

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK



Lo-swing IMP

TURNS AND GROOVES DISTRIBUTOR ROTORS WITH SPEED AND ACCURACY

Problem: To turn contact ring, distributor points and locking ring groove on Distributor Rotors. All machined surfaces must be concentric with the taper bore and have a fine, smooth finish.

Solution: The Lo-swing IMP Automatic Lathe was selected for this job because its design and construction provide the necessary speed, productive capacity and close accuracy demanded.

The Distributor Rotor is mounted on a special arbor which is accurately fitted to the headstock spindle bore, and prevented from working loose by a suitable locking bolt. The small end of the arbor is supported by a revolving tailstock center carrying a hardened and ground bushing which maintains a constant pressure on the end of the work piece, preventing any end play.

The contact ring and the distributor points are turned with three cemented carbide tools mounted on the front slide, while the ring groove is formed with a similar type tool mounted on the rear slide. The turning tools are properly spaced so that the intermittent cutting on the distributor points will not mark the contact ring. At the completion of the machine cycle, the operator throws an air valve, relieving the tailstock center and also actuating the work stripper arm located just over the headstock spindle.

The machine cycle is extremely fast and the operator's work is reduced to the strict minimum of loading the parts on the arbor and pushing the starting lever.

Consult our Engineering Department for full information regarding time and other saving equipment.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH *Lo-swing*

American Machinist REFERENCE BOOK SHEET

How Colloidal Graphite Aids Metal Forming

BY G. C. GILES, ACHESON COLLOIDS CORPORATION

In normal lubrication, the temperature of rubbing parts may rise somewhat above room temperature because of frictional heat. But there are a number of metal-working processes, where the temperature of the parts is raised by an additional source of heat, and as a consequence the final temperature may be quite high. What this temperature is depends on the equipment, the operating speed and the process involved.

At elevated temperatures, conventional petroleum lubricants either decompose or distill off. Typical metal-forming processes where this type of failure can occur are: press forging, wire drawing, piercing of hot work, hot forming of magnesium alloys, extruding of aluminum. But when semi-colloidal or colloidal graphite is dispersed in a low-carbon petroleum product, a special carrier or water, a film is deposited on the work or tool. Such films may have these properties to promote or maintain lubrication, reduce wear, enable production to proceed: chemical inertness; resistance to oxidation; good heat conductance; corrosion resistance; ability to function as a solid lubricant in the complete absence of fluid films, and insolubility under attack by acids or alkalies.

From experience with lubrication problems connected with various hot-forming operations, these mixtures of collidal graphite and dispersion agent, and methods of applying them, have been worked out:

Press Forging Die Lubricant—To achieve quick flow of metal to all parts of dies used in hot forging of brass objects, use a simple mixture of semi-colloidal graphite and water. Apply with a long nozzle, high-pressure spray having spray tips that form a *T*-shape, so both the upper and lower halves of the die may be lubricated simultaneously with a finely atomized spray.

Heat from the die will quickly evaporate the moisture, leaving a thin, highly tenacious film of graphite. Other advantages are: better detail on intricate shapes; better parting, cleaner, smoother finish; longer die life. This practice can be extended to forging of other metals.

Wire - Drawing Die Lubricant—To lubricate dies effectively for drawing steel wire, use a three-component mixture consisting of semi-colloidal graphite, water and a binder which also serves as a non-foaming wetting agent. Mixing is usually accomplished in a large kettle or vat. The steel wire or rod is immersed in the solution and then withdrawn, placed in an oven or force dried by other means at a temperature of 200 F. The thin film of graphite formed on the stock by this method will carry over on each successive reduction, enabling users to obtain up to 200,000 pass pounds per 90 gal. of solution. Longer die life and wire of uniform diameter will result.

Lubricant for Piercing Punches on Hot Work — To provide a non-galling, self-lubricating surface on piercing punches, use a simple mixture of colloidal graphite and water. Metal surfaces to be treated should first be thoroughly degreased and then heated to 250 F. Apply the lubricant by brushing, spraying or dipping. Heat will hasten drying of the graphite film and more tenaciouly bond the tiny graphite particles to the metal surface. Renew treatment whenever practice indicates that it is necessary. Films formed in this manner have been found to possess desirable low-friction properties that will appreciably reduce wear, improve surface finish, and frequently eliminate subsequent machining operations.

Lubricant for Hot-Forming Magnesium Alloys — To prevent magnesium sheets from seizing on the die and loading with metal particles, use colloidal graphite suspended in naphtha. The sheets are sprayed with the lubricant, using a standard paint-spray gun with the nozzle regulated so one pass of the gun will coat the sheet with an unbroken film of lubricant. The carrier fluid in the coating material will evaporate rapidly, eliminating any need for a time interval for sprayed blanks to dry. Any surplus graphite lubricant remaining on the sheet after the forming operation is removed in a chromic-acid bath.

Colloidal graphite in mineral spirits is used to coat the forming dies. The graphoid film prevents die fouling, improves the flow of metal in the die and facilitates removal of the finished object from the die.

Die Lubricant for Extruding Aluminum—To alleviate metal pick-up on extruding dies used for forming aluminum tubing and structural shapes, use semi-colloidal graphite dispersed in water. Ingots are heated in ovens to approximately 1050 F., placed on presses and then extruded. Extruding temperatures are between 875 F to 900 F. Spray dies before each extrusion, using a paint-spray gun. One gallon of lubricant is normally consumed per press per shift. Mandrels may be similarly lubricated. If failure of the lubricant to wet the mandrel is encountered, spray colloidal graphite dispersed in mineral spirits mixed with kerosene.

Hot Conveyors — Use colloidal graphite in kerosene applied in conventional manner.

Oven-Car Wheel Bearings—Use colloidal graphite in kerosene. If bearings are equipped with grease fittings, remove fittings and apply mixture through tapped opening with oil can. Objectionable carbon deposits will not be formed.

Die-Casting Machine Plungers—Use colloidal graphite in oil of low carbon content.

Machine-Tool Ways — Apply colloidal graphite in machine oil to prevent chatter and reduce wear.

High-Speed Tool Drives—Use colloidal graphite in grease recommended by manufacturer. One test report indicates that accelerated wear life of a high-speed grinder was raised from 50 to well over 650 hr. (equivalent of 10 to 20 years of service life) by the addition of colloidal graphite to the lubricant.

3/8" Cut on S.A.E. 4640 Steel

SUNOCO EMULSIFYING CUTTING OIL

Permits Heavy Cut on 5" Heat-Treated Shaft

Here is a tough job, just one of thousands in which Sunoco makes possible fast, accurate machining:

Machine — 20" x 96" "American" Pacemaker multi-production lathe
Operation — Turning 5" diameter shaft
Material — S.A.E. 4640 steel, heat-treated
Spindle Speed — 133 r.p.m.
Cutting Speed — 175 s.f.p.m.
Depth of Cut — 3/8"
Feed — .015"
Tool — Cemented carbide
Cutting Lubricant — One part Sunoco to 20 parts water

For greater production, greater accuracy, smoother finish, put Sunoco, the "Job Proved" oil, to work in your shop. Sunoco quickly forms a stable emulsion when mixed with water. It has high lubricating and cooling qualities and is recommended for ferrous and nonferrous metals, alloy and carbon steels. For full information, or for a free copy of "Cutting and Grinding Facts," call the nearest Sun office today, or write Department AM6.

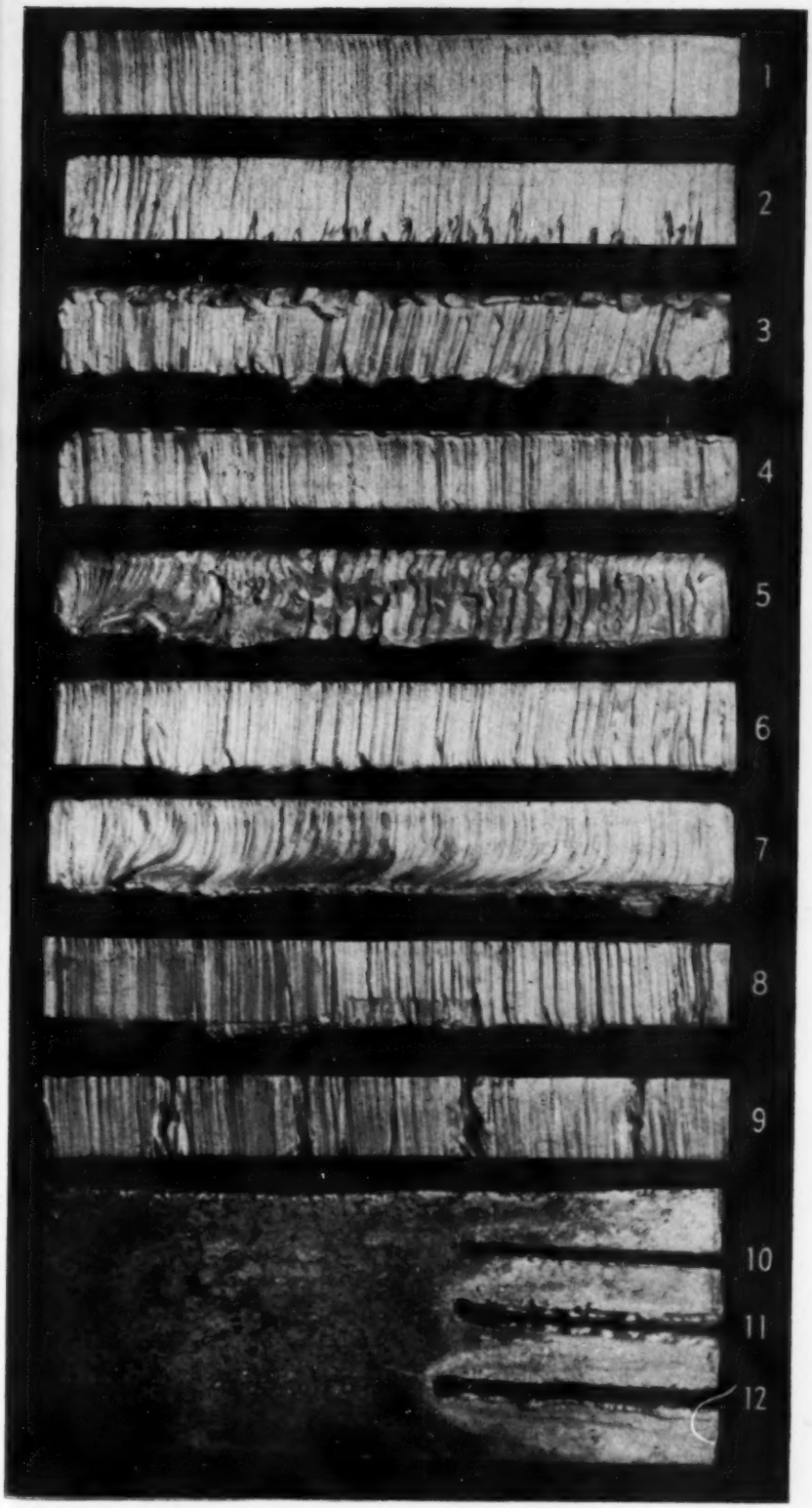
SUN OIL COMPANY · ***Philadelphia 3, Pa.***

SUN
SUNOCO
INDUSTRIAL PRODUCTS

American Machinist

REFERENCE BOOK SHEET

Faults to Avoid in Torch-Cutting



COURTESY
LINDE AIR PRODUCTS COMPANY

When cutting plate with the hand torch, faulty workmanship may arise from a variety of causes. These defects are explained below in connection with several examples at the left. For comparison, a correctly made cut in 1-in. plate is shown in Fig. 1. Here the edge is square and the drag lines are vertical and not pronounced.

Defects

2—Gouging at bottom, because preheat flames were too short — only about ⅛ in. long—and cutting speed was too slow

3—Top surface melted over, cut edge irregular, and too much slag. The preheat flames were too long—about ½ in.

4—Top edge melted over because the cutting speed was too slow. Too low an oxygen pressure was used

5—No control of the cut because oxygen pressure was too high and nozzle size too small

6—Irregular kerf lines produced because the cutting speed was too slow

7—The cut edge is irregular and there is rake or lag to the cut lines from using excessive cutting speed

8—A wavy and irregular cut edge was produced by unsteady blowpipe travel

9—Gouges were caused where the cut was restarted, because the cut was lost and not carefully recommenced

Good and Bad Kerfs

10—A good kerf made by correct procedure

11—Top edge melted over by too much preheat and nozzle too close to plate

12—Tapered kerf resulting from holding the nozzle too high above the plate, so the heat and oxygen stream could spread.

the grinding job

Grinding with efficiency and economy on the production lines of American Industry . . . from precision finishing a wide variety of component parts for the automotive industry to rough snagging castings and billets in foundries and steel mills. *Every industrial plant uses grinding wheels!*

the wheel

Simonds Abrasive Co. Borolon and Electrolon Grinding Wheels vitrified, silicate, resinoid or shellac bonded . . . in every required size, shape and grain and grade specification . . . fast cutting, long lasting—for extra efficiency, top economy on every grinding job.

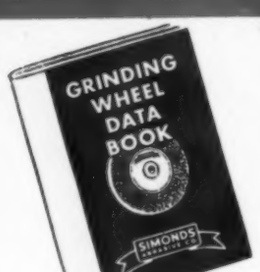
Borolon ALUMINUM OXIDE — *Electrolon* SILICON CARBIDE

SIMONDS ABRASIVE CO.

PHILADELPHIA, PA.

Grinding Wheels

Every size and shape for every grinding job . . . centerless, crankshaft, cut-off, cylindrical, internal, knife grinding, mounted points, portables, roll grinding, saw gumming, snagging, surfacing (wheels and segments), tool and cutter, bricks, sticks, stones and abrasive grain for polishing, pressure blasting, anti-slip, etc.



where to get it

From your Simonds Abrasive Co. Distributor located in all key industrial centers here and in many foreign countries. He carries local stocks and can advise on grinding wheel selection. Write today for our Grinding Wheel Data Book, 112 pages of practical information about grinding wheels and their uses. Also contains name and address of distributor serving your area.

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Philadelphia, Pa.
Electric Furnace Plant, Simonds Canada Abrasive Co., Ltd., Arvida, P.Q.

SIMONDS ABRASIVE COMPANY
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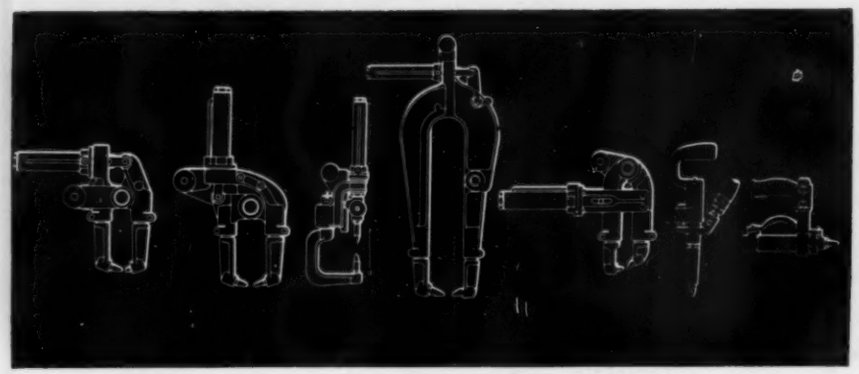
SIMONDS CANADA SAW CO. LTD.
Montreal, Can.
Simonds Products for Canada

You can count on the utmost efficiency when you use Simonds Abrasive Company grinding wheels—products quality controlled from the crude abrasive produced by our own electric furnace plant, Simonds Canada Abrasive Co., Ltd., to the finished wheels, tested and ready for top performance—efficient production tools backed by their manufacturer's experience as a major manufacturer of grinding wheels and abrasives exclusively for over 50 years. For consistently high quality results, use Simonds Abrasive Company wheels.

SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PENNA. • DISTRIBUTORS IN ALL PRINCIPAL CITIES

Shop Equipment News



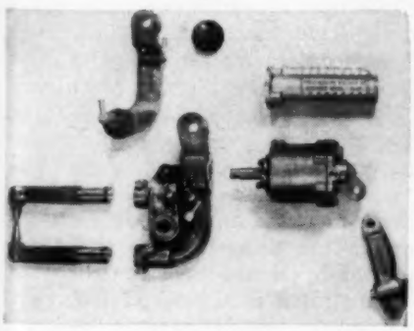
Spot-Welding Guns by Progressive Feature Standardized Components

A line of standarized spot-welding guns are offered by Progressive Welder Co., 3050 E. Outer Drive, Detroit 12, Mich., designed with and constructed from interchangeable standardized-component parts. Seven basic types, in heavy-duty and standard-duty versions, are said to take care of 95% of all gun-welding requirements.

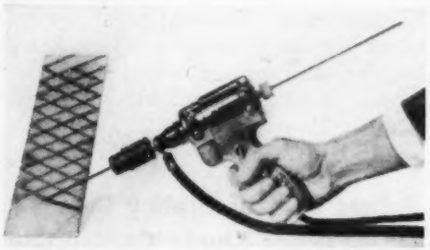
Basic standard parts of the welding guns are the gun chassis, the jaw extensions, the interchangeable hydraulic or air-operating cylinders, optional cable locations, handles, and universal-cable terminal clamps, switches, electrodes, and electrode holders.

In addition to the standardization of parts, most of which are interchangeable between all guns of the standard line, many other units such as boosters, air valves, and other sub-assemblies have also been standardized.

Guns are designed to take interchangeable hydraulic or air-operating cylinders to suit individual-plant requirements. When operated hydraulically, the cylinders themselves serve as gun handles. They are provided with non-slip grips and clamp-on switches which can be located in desired position. For air operation, standardized double-end handles which can be locked in any position on the top of the cylinder, can be furnished.



Typical gun disassembled to show standardized parts which are interchangeable with other standardized parts to vary the gun design for varied applications



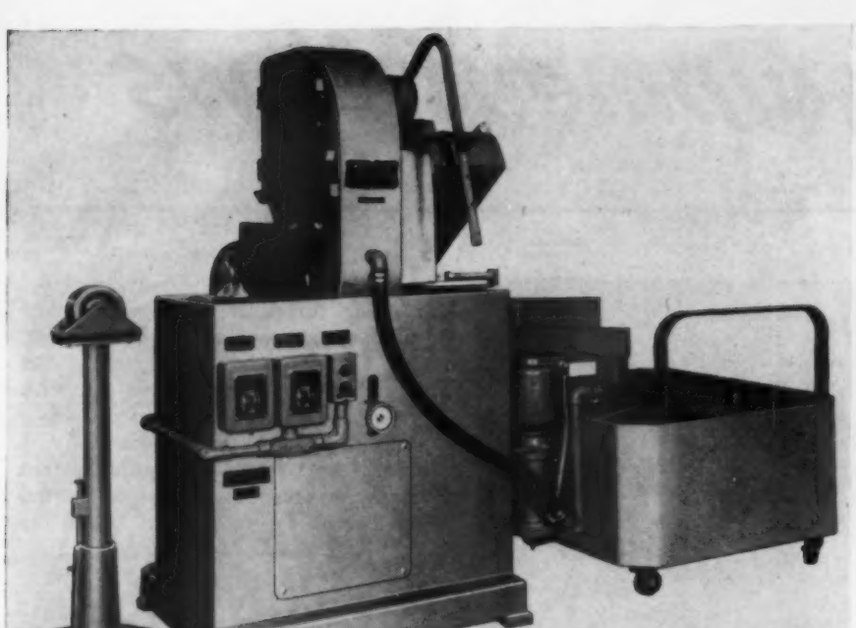
Vibrating Electrode Holder Deposits Hard Rough Beads

A vibrating electrode holder, the Ruf-Tred tool, is offered by Metallizing Engineering Co., Inc., 38-14 30th St., Long Island City 1, N. Y. Holder provides a method of preventing slipping and falling accidents on smooth steel or iron surfaces. Holder, used with either ac. or dc. welding machinery, deposits hard rough bead lines about ⅛ in. wide and 1/16 in. high. The end of the electrode is placed in contact with the surface to be roughened, and is drawn along at approximately 5 fpm. Vibrator causes intermittent arcing, which melts the end of the hard-steel electrode and fuses the molten droplets to the base.

Nilco Portable Dial Bore Gage Measures Internal Diameters

Nilsson Gage Co., Inc., Poughkeepsie, N. Y., offers the Nilco dial bore gage as a visible-control inside-diameter indicator gage. The portable unit is designed for rapid and accurate measurement of small internal diameters. The dial indicator has graduations in 0.0001 with a total travel of about 0.008.

In setting, head is inserted into the master gage. The spring-tensioned range extension is released while in the master as the gage is tilted on a slight angle. One twist of the locking sleeve automatically locks the range extension that is located at the bottom of the head. No locknuts, screws, or wrenches are needed. When range is determined, fine adjustments to size on the indicator are made with a simple key arrangement. Gage cannot be tampered with as bezel is not exposed.



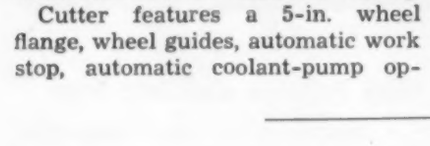
Campbell Hand-Operated Bar Cutter Is Wet Abrasive-Cutting Machine

Andrew C. Campbell Div., American Chain & Cable Co., Inc., Bridgeport 2, Conn., offers the Model 223 bar cutter, a hand-operated wet abrasive-cutting machine for fast cuts on practically all types of materials up to 2-in. diameter solid stock and 3½-in. diameter tubing.

Cutter features a 5-in. wheel flange, wheel guides, automatic work stop, automatic coolant-pump operation, and an automatic hydraulic work clamp.

A separate wheel-mounted coolant tank is an additional feature. Tank permits removal for chip cleaning. Separate compartments settle out sludge and keep coolant cool. Coolant is distributed over the wheel, said to result in straighter cuts, and longer life of the wheel. All interior parts are cadmium plated.

LIVE CENTERS adapted to tube turning are offered by Sturdimatic Tool Co., 5220 Third Ave., Detroit 2, Mich., in 1⅞-, 2⅜-, 2¾-, and 3¼-in. diameters. Standard shanks with Morse tapers are carried in stock while other sizes, taper and blunt-nose type, are built to specifications. A low overhang and a slight cushioning action are said to compensate for expansion due to heat, shock and excessive thrust loads



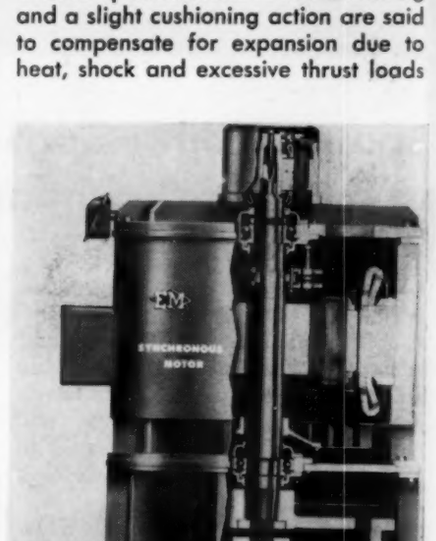
Light, Self-Operating Spot-Welder Is Portable, Weighs about 23 lb.

A lightweight portable self-operating spot-welder is marketed by Greyhound A. C. Arc Welder Corp., 604 Johnson Ave., Brooklyn 6, N. Y. Welder weighs approximately 23 lb., and welds up to ⅛-in. combined thickness of metal.

The spot-welder is inclosed in a non-corrosive cast-aluminum casing with an integral aluminum handle. The copper arms are available in three lengths—6, 12, and 18 in. Replaceable special-alloy tips are available in an assortment of shapes for specific needs. Each unit has a silicon-steel and copper transformer wound with burn-out-proof spun-glass insulated magnet wire. Each welder is supplied with 10 ft. of cable. Model is available in either 220- or 110-v. ratings.

Pallets Built of Grating Bars Feature Sturdy Construction

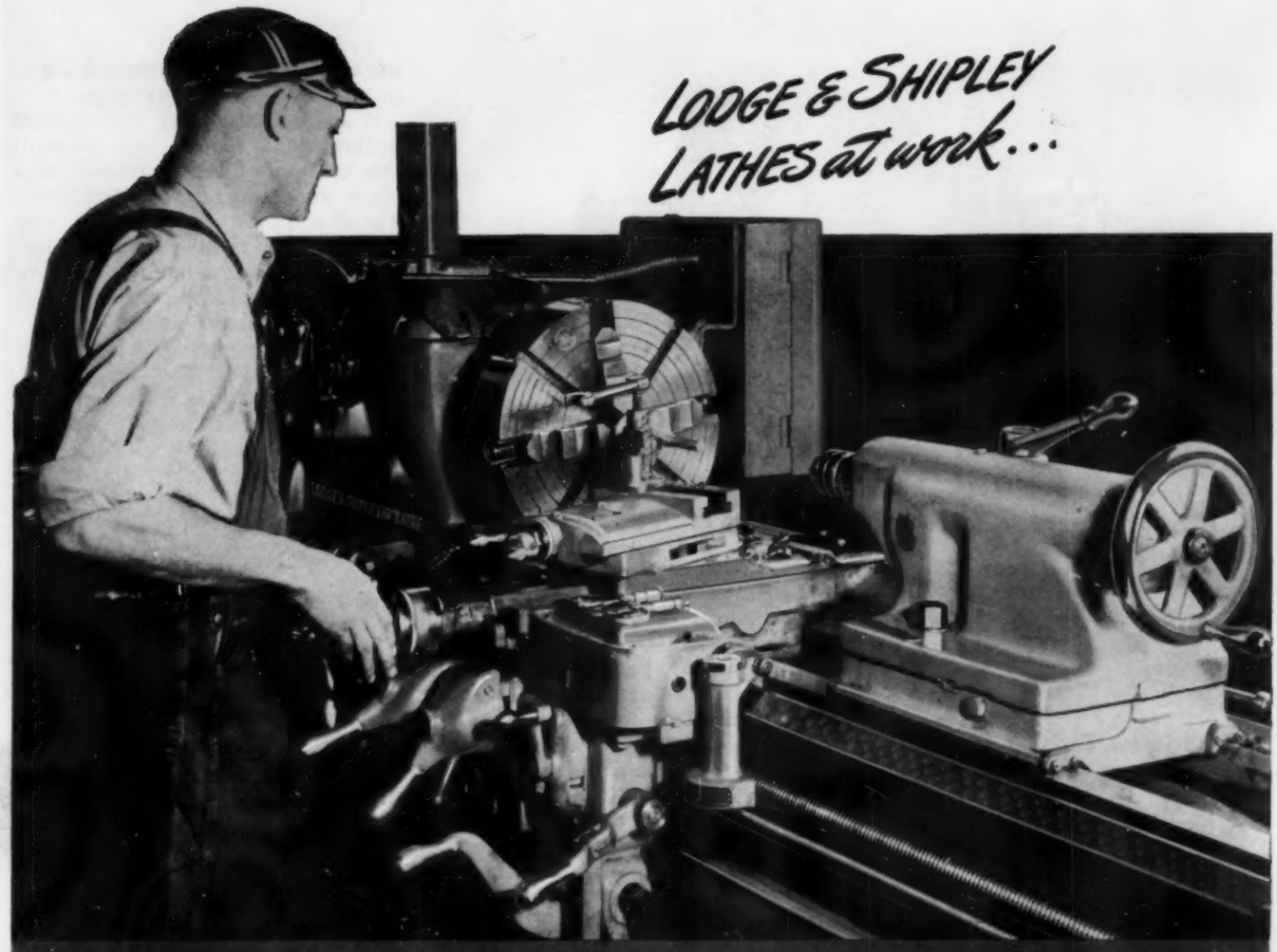
A line of steel pallets, built of grating bars set on edge for strength, are introduced by Kerlow Steel Flooring Co., 222 Culver Ave., Jersey City 5, N. J. Pallets are designed for lift by a fork truck at any of the four sides or four corners. All corners are rounded. Pallets are available either plain or with closure. Tote boxes are also available.



Vertical Magnetic-Drive Unit Gives Adjustable-Speed Control

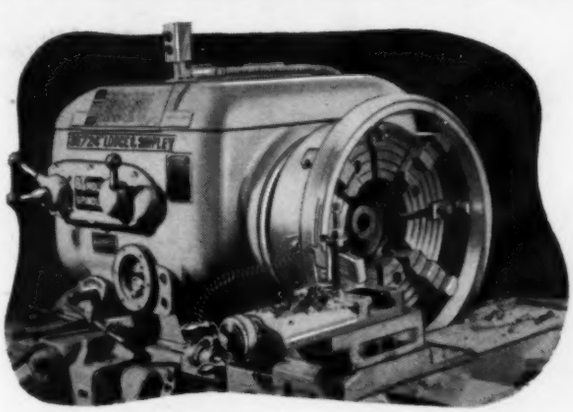
A vertical synchronous-motor magnetic-drive unit with adjustable-speed control for centrifugal pumps is introduced by Electric Machinery Mfg. Co., Minneapolis 13, Minn. Motor drives the ring of the magnetic drive at constant speed. The magnet member of the magnetic drive mounted on the gear shaft operates the pump at the speed required by liquid-level control.

Illustrated is a 250-hp., 1200-rpm. drive unit which operates 200-rpm. vertical sewage pumps through a reduction gear. Unit offers wide-range speed control, and is said to preclude hunting and to eliminate frequent motor starts and stops.



"HIGHLY ADAPTABLE"

...reports famous rubber manufacturer



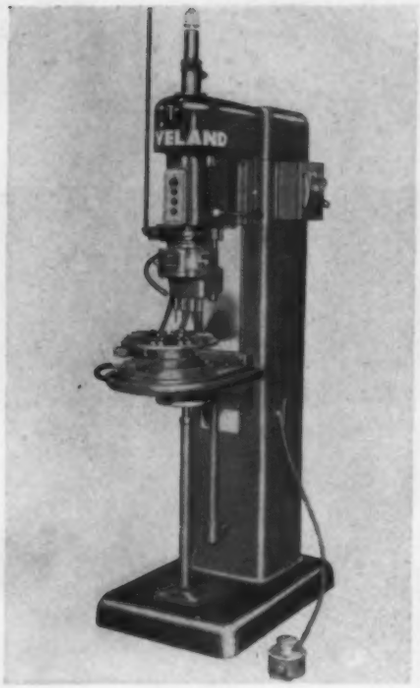
Turning the end ring for a belt curing drum is one of the many jobs performed by Lodge & Shipley Lathes in helping to produce 90% of this firm's machinery and equipment.

• Ninety per cent of all the machinery used in this noted rubber plant is produced in its own shops. The highly varied and specialized work demands lathes of wide versatility and adaptability. Shafts, gear blanks, mold work, die work are speeded into the production line with these new Lodge & Shipley Lathes. The full range of speeds and feeds is utilized to perform all possible lathe operations.

• Whatever the job, look to profit-producing Lodge & Shipley Lathes to speed your work, increase your output. In plants near you these Lathes are setting ever-higher production records at ever-lower costs. A Lodge & Shipley representative will gladly show you typical installations, furnish facts and figures on their profit making capacity.

THE Lodge & Shipley COMPANY

MACHINE TOOL DIVISION • 3055 COLERAIN
SPECIAL PRODUCTS DIVISION • 800 EVANS ST.
CINCINNATI 25, OHIO



Lead-Screw Tapping Machine By Cleveland for Small Holes

The Model EO lead-screw tapping machine is offered by the Cleveland Tapping Machine Co., Hartville, Ohio. Powered by a ¾-hp. 1200-rpm. high reversal motor, it will tap single holes up to ½-in. National Coarse Thread in mild steel, or, using multiple heads, up to eight No. 6-32 or four ¼-in. holes.

Tapping depths are controlled to within 0.005 in., which is said to make blindhole tapping safe. Three optional spindle-speed ranges are offered. A motor-driven centrifugal pump directs a steady stream of coolant from a 5-gal. tank in the base.

The lead screw is precision ground to 0.0002 in. Featured are an automatic air-indexing table and a four-spindle head.

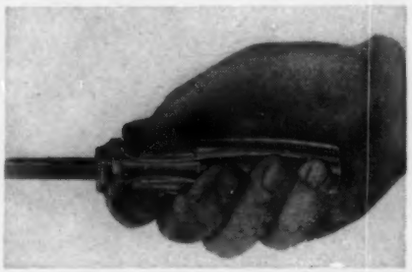
Three All-Steel Press Brakes Feature Welded Construction

Three all-steel welded press brakes are announced by Knight Machinery Co., 1001 S. Delaware St., Indianapolis, Ind. Featured are micrometer dials for out-of-parallel adjustment of ram, and infinitely variable speed adjustment. Extra equipment is also available and consists of front-operated gages, extra width platen, light behind ram and standard and special dies. Machines are available in 24-in. by 18 gage, 36-in. by 18 gage, and 48-in. by 18 gage capacities.

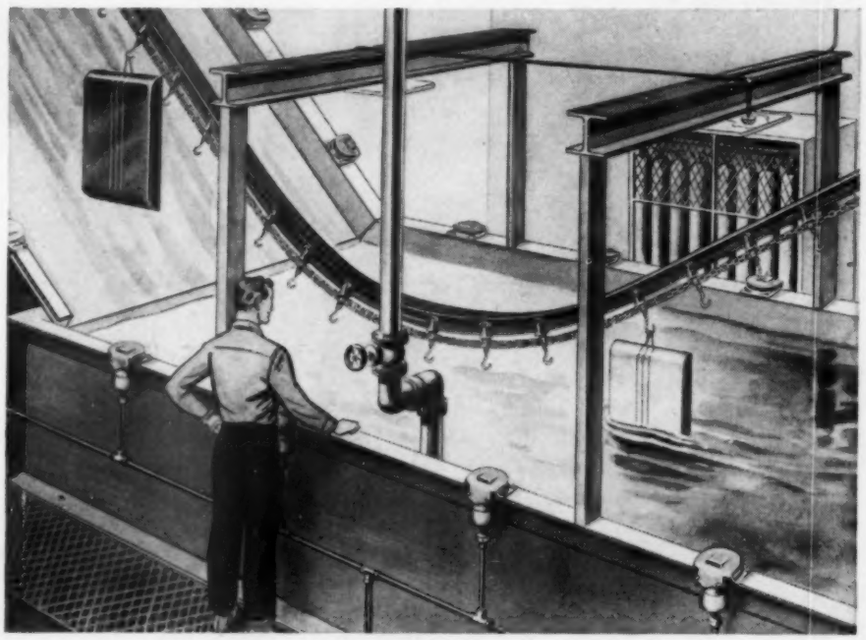
Portable Pantograph Machine Works in Two, Three Dimensions

Mico Instrument Co., 80 Trowbridge St., Cambridge 38, Mass., offers the No. 252 2- and 3-dimensional engraver. The portable pantograph machine is designed to make small dies and molds for plastics, rubber, glass, die castings, templets or other similar forming operations. The engraved work and the master copy are right-side up and in sight of the operator at all times. Three-dimensional milling is accomplished by tracing the shape of an enlarged master with the stylus. The raising of the stylus arm of the pantograph automatically lifts the cutter from the work, and gives unlimited access to the work and master copy.

A specially designed yoke permits 3-dimensional work, and prevents the nicking of the engraved work when the pantograph is lifted. Spindle is equipped with a chuck that holds midget milling cutters, burrs, or mounted points having ⅛-in. diameter shanks. A micrometer depth control, graduated in 0.001 in. of feed, has a range of 0.250 in. regardless of ratio used. The standard micrometer spindle is interchangeable with spindles designed for special-purpose work.



PLASTIC-HANDLE screwdrivers, made by Plomb Tool Co., Los Angeles 54, Calif., feature re-shaped handles with lengthwise ridges to prevent hand slippage. The plastic selected is non-flammable and is a good insulator. Handles are molded on the shanks instead of being driven into place



NOZZLE for dip-tank fire protection is offered by Walter Kidde & Co., 40 East 24th St., New York 16, N. Y. The type L multi-jet nozzle is designed for smothering dip-tank and drainboard flammable-liquid fires with carbon-dioxide gas. Gas is emitted in a fan-shaped blanket that hugs the liquid surface. Depth of nozzle from front to back is kept at a minimum to permit installation of inlet piping close to tank sides

Gears & Involute Splines
Included Angle Splines
Cams and Over-Running Clutches
Sliding Clutches
Special Forms
Toothed Parts
Special Forms
Ratchets
Straight Sided Splines
Inverted Splines
You can cut
SHAPES LIKE THESE
faster, more accurately, at lower cost
ON THE MICHIGAN
SHEAR-SPEED*
SHAPER
a gear shaper, a contour former,
an external broaching machine
Ask for Bulletin No. 1800-47
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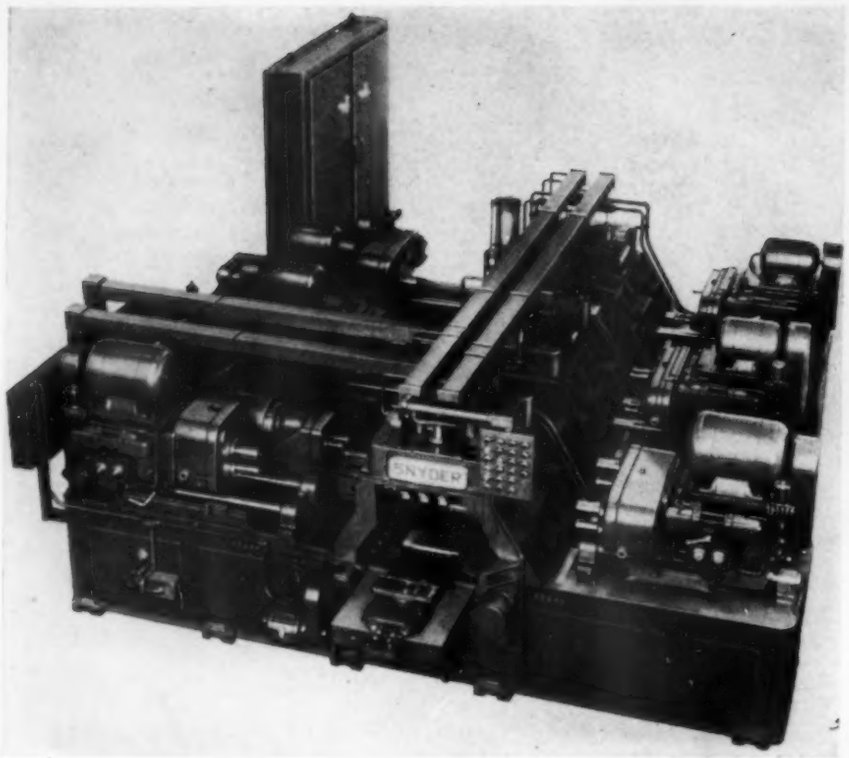
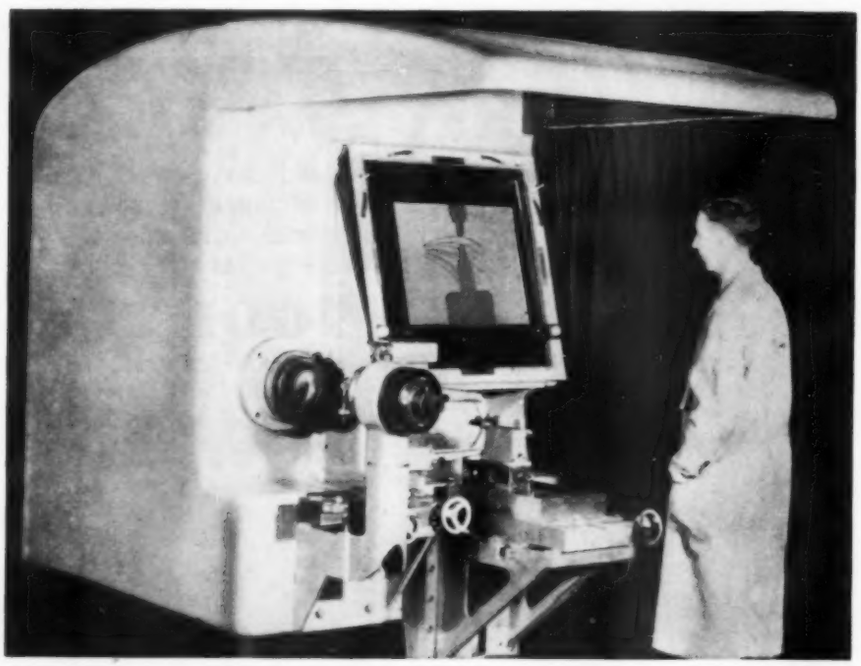


SPECIAL MACHINE made by Snyder Tool & Engineering Co., Detroit 7, Mich., combines a series of core-drilling, drilling, boring, counter-boring, spot-facing, chamfering, and semi-finish-boring operations. Cylinder block is moved from conveyor on to first transfer plate, which acts as a turntable. Transfer mechanism is hydraulically actuated and transfers eight cylinder blocks simultaneously. Blocks are hydraulically raised and clamped against the oil-pan face at work stations. Production is 40 units per hr. at 80% efficiency

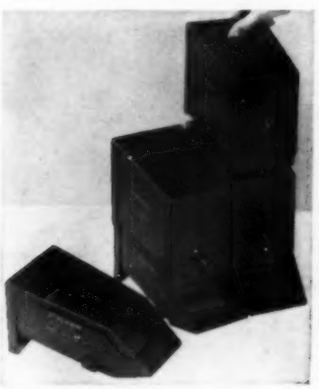


PROJECTION LENS, used on the special blade-checking optical comparators for inspecting foil contours on turbine blades, is made by Jones & Lamson Machine Co., Springfield, Vt. The 434mm. lens will take in a 6-in. dia. inspection area and project it at 5 magnifications on a 30-sq. in. screen. Lens aperture is 6⅝ in. in diameter. Back focal length is 12½ in. A specially designed condensing lens is part of equipment

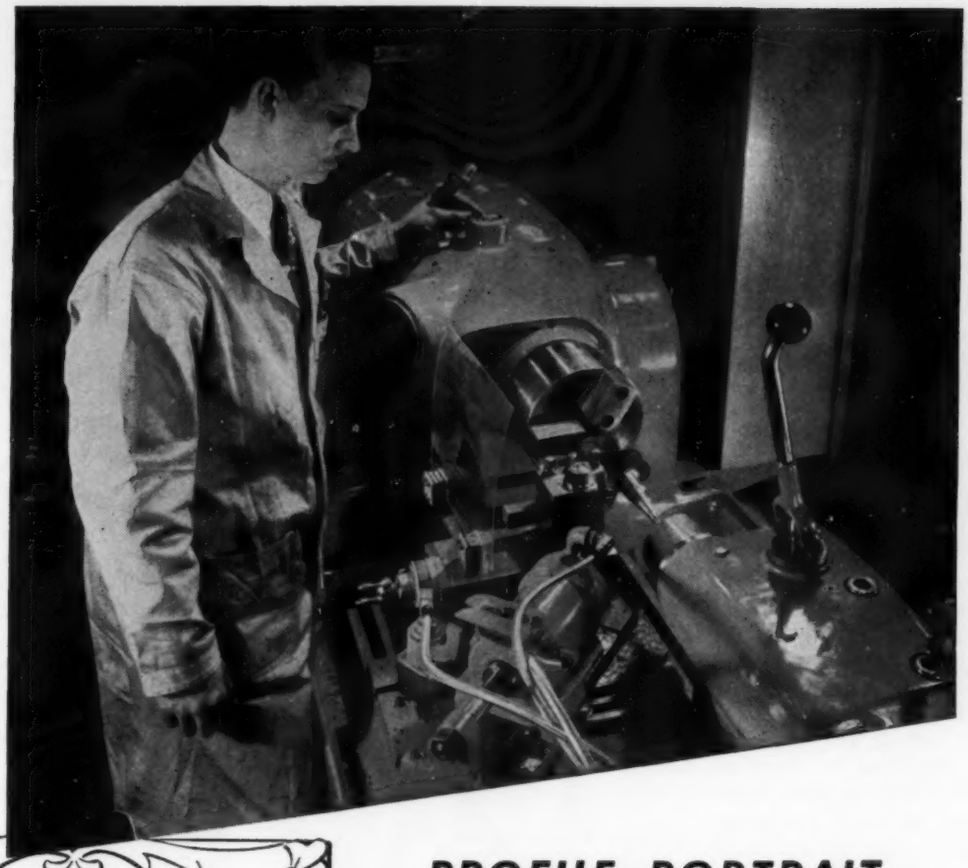
GE Portable Potentiometer Measures Very Low Voltages

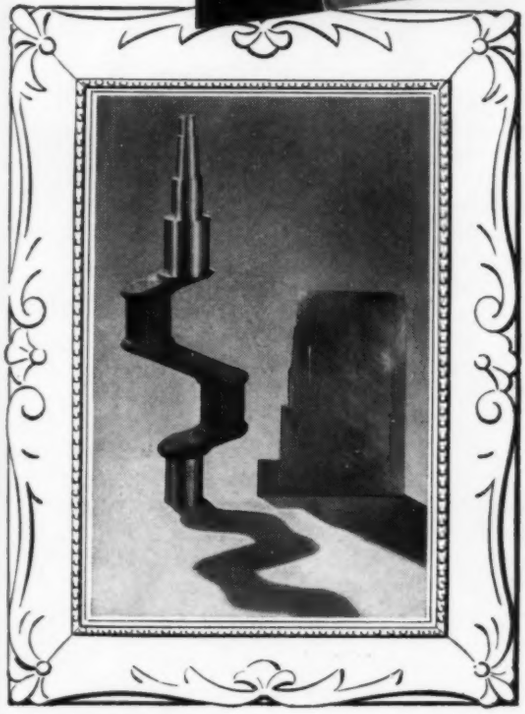
A portable potentiometer has been developed by the Meter and Instrument Div., General Electric Co., Schenectady 5, N. Y., for precise measurement of very low voltages. Potentiometer checks temperature-measurement instruments, and tests rotating machines, ovens, furnaces, steam-driven equipment, and air-conditioning units.

Equipment, contained in a luggage case, includes the galvanometer, standard cell, working batteries, and rheostats. Potentiometer has two ranges, 0-60 and 0-6 millivolts. Voltage to be measured is read on two dials, with each step on the first dial being 0.2 millivolt, and each division on the second dial, 0.001 millivolt.



ADJUSTABLE HOPPER with a sliding front is made by Stackbin Corp., Pawtucket, R. I. Hopper is said to prevent the overflowing or jamming of parts. Its opening can be made small or large according to necessity. When two hoppers are used, one on top of the other, the increased weight of parts, which tends to force out too many parts, can be offset by regulating size of opening





PROFILE PORTRAIT OF PRODUCTION

Floor-to-Floor Time—24 Seconds!

(Former Machining Time, on Multiple Tool Automatic—40 Seconds)

Here's a $10\frac{3}{4}$" compressor crankshaft machined within limits of .0005" maximum error on all diameters—as proved on a 2,000 lot run.

That's the Monarch way to "*peak production at a profit*".

The machine that makes this outstanding record is a 2,000 rpm Monarch Uni-Matic, equipped with the new Air-Gage-Tracer Uni-Mat—just announced at the Machine Tool Show.

With this Uni-Matic you'll get not only greater accuracy and increased production—you'll get finished parts at a fraction of the former tool cost—and with substantially less down time.

On this job, tool change, necessary only after 350-400 pieces, requires less than one minute.

All surfaces of the crankshaft are machined by a continuous, single tool cut. A chamfer, multiple diameters, a taper, radii and shoulders—all are Air-Gage-Traced from the master template on a fully automatic machining cycle. The operator merely loads, presses the starter button, and unloads when the cycle is complete.

May we show you how the Monarch Turning Machines can cut costs in your shop?

ACCURACY · ECONOMY · LONG LIFE

Monarch TURNING MACHINES

THE MONARCH MACHINE TOOL CO., Sidney, Ohio

FOR A GOOD TURN *FASTER* —— TURN TO MONARCH

Fluorescent Lamp Around Lens Offered on Supersite Magnifier

The Supersite magnifier is designed with an 8-in. lens and a 12-in. fluorescent lamp which circles the lens and provides illumination without a shadow at every point directly under the lens. Made by The Safety Center, 542 S. Dearborn St., Chicago 5, Ill., the model 7 WFC-88, illustrated, is constructed with a cast-iron frame and base and a double-elbow arrangement to permit exact lens positioning. Magnifier has a 7-in. field.

Double-End Spindle-Type Grinder Capacities No. 6 to 3-in. Taps

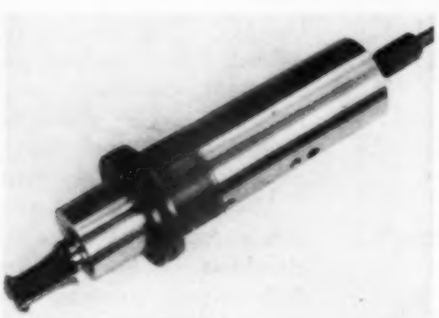
The model 2D-1 tap grinder with a capacity from No. 6 to 3-in. taps is introduced by Gallmeyer & Livingston Co., Grand Rapids, Mich. Machine is a double-end spindle type and grinds two taps simultaneously on the two wheels.

It is claimed that taps ground on the Grand Rapids tap grinder will cut clean, sharp, accurate threads in tapped holes with less than half the power required for the hand-ground type of taps.

Grinder will grind taps with two, three, four, five, or six flutes. The threads can be A.S., S.A.E., V.S.A.E., Acme, Square, and others. A special attachment for bent-shank taps is available.

Any desired angle of entrance taper at the point of the tap can be ground. A diamond-truing device with two diamonds is furnished as part of the standard equipment. A 1½-hp. motor drives spindle.

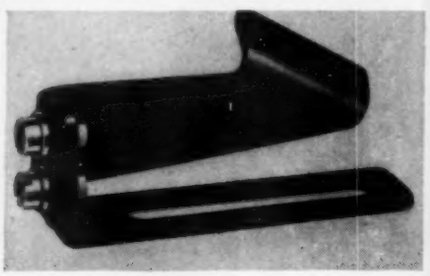
GOGGLE, made by Chicago Eye Shield Co., 2300 Warren Blvd., Chicago 12, Ill., utilizes a forehead rest and balanced-temple suspension. Called the Cesco Spec-Lite goggle, it weighs 1 oz. Goggle features large coverage up, and down, and laterally. Spec-Lite can be adjusted for fitting various faces. The one-piece plastic lens is replaceable. Goggle can be worn over personal glasses and comes with either clear or glare-reducing green-plastic lenses.

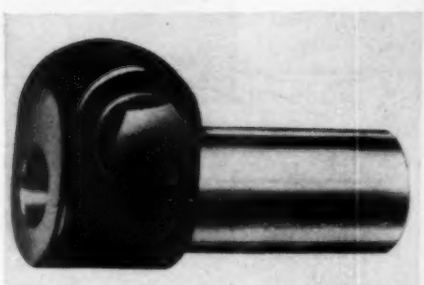


Automatic Recessing Toolholders For Automatic-Feed Machines

Automatic recessing toolholders have been developed by The Maxwell Co., Bedford, Ohio, for use with machines having automatic feeds. Tools are operated by a draw-bar having a telescopic adjustment for tool location. Circular form cutters, either high-speed steel or carbide tipped, can be used.

Adjustment for depth of recess is made by a collar on the toolholder body. Toolholders are available in a range of sizes to accommodate all standard types of slide toolholders. Featured is a positionable cutting-tool block which makes it possible to design form cutters having minimum overhang. Provision is made for introducing lubricant or coolant through tool to cutting edge. A set of variable-length draw-bar components are included.





Line of Screw-Machine Tools Includes Turret-Tool Adapters

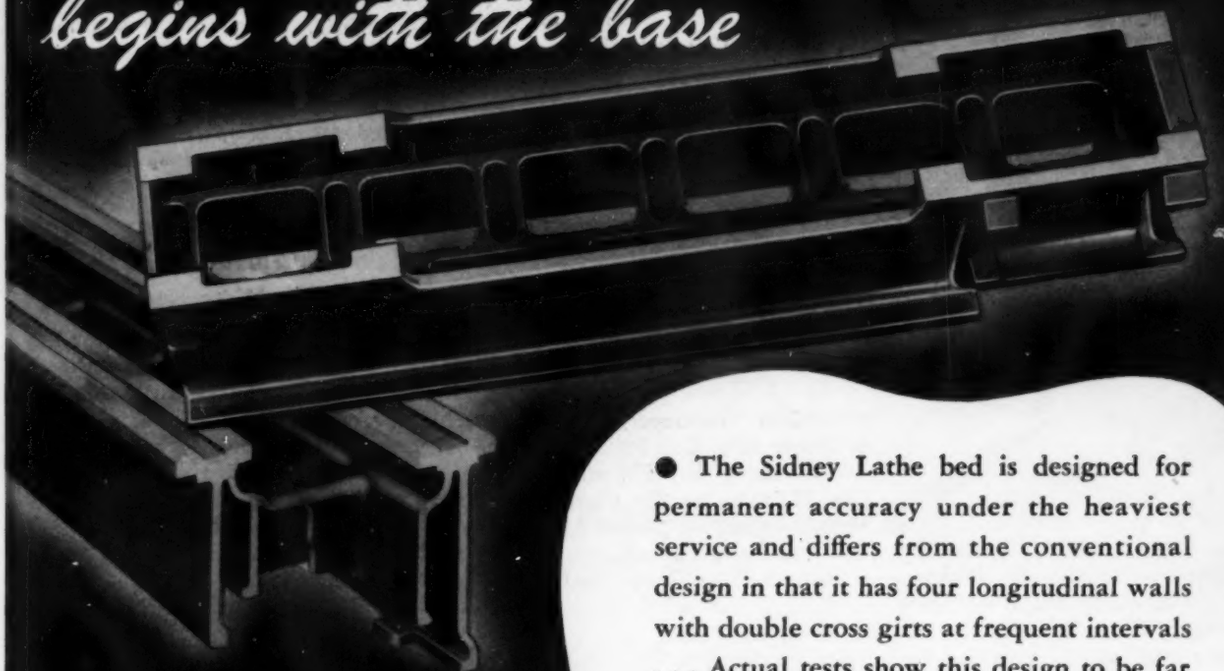
Brown & Sharpe Mfg. Co., Providence, 1, R. I., announces several screw-machine tools. The closer for opening die holders, Model No. 200, upper illustration, can be used on all three sizes of No. 00, 0, and 2 automatic screw machines for closing self-opening die heads, Closer is attached to the top front of the bed castings, and has longitudinal adjustment for correct positioning.

Turret tool adapter No. 20-00 permits the use of No. 00 size tools on No. 0 size automatic screw machines. The No. 22-00 adapter, lower illustration, permits the use of No. 00 size tools on No. 2 machines, and the No. 22-20 adapter permits the use of No. 0 size tools on No. 2 machines.

Also offered are revolving stock stops for turrets. Stops position the end of the stock at a specified distance from the nose of the collet. The thrust on the head is taken by a ball which allows the head to rotate freely and prevents marring of the outer end of the workpiece.

STURDY CONSTRUCTION

begins with the base



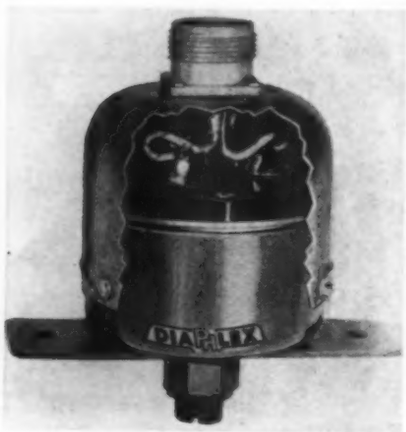
Sidney Lathes

● The Sidney Lathe bed is designed for permanent accuracy under the heaviest service and differs from the conventional design in that it has four longitudinal walls with double cross girts at frequent intervals . . . Actual tests show this design to be far superior to the customary two-wall construction . . . Casting is of a steel-nickel-gray iron mixture producing a close grain and smooth wearing surface that withstands years of hard service . . . Sidney Lathe beds can also be furnished with hardened and ground tool steel bed ways if desired.

SIDNEY MACHINE TOOL COMPANY • SIDNEY, OHIO

Builders of Precision Machinery Since 1904

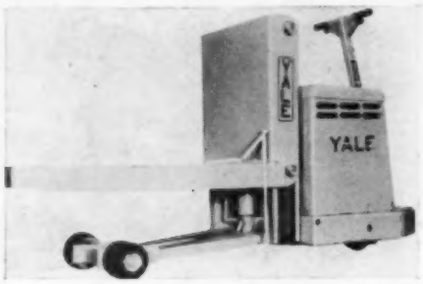
HONING MACHINE is made by Staples Engineering Co., Birmingham, Mich. Listed as Model B-3, it will hone parts ranging from ¼- to 4-in. I.D. A machined surface is provided for mounting work-holding fixtures. For production work, parts are held in a fixture and stroking is by hand. For toolroom use, work is generally held and stroked by hand. A ½-hp. motor drives the spindle



Hydtrol High-Pressure Switch Operates from 50 to 5000 psi.

A high-pressure switch, the Hydtrol, is offered by Diaphlex Div., Cook Electric Co., Chicago 14, Ill. Design features linear adjustment over an operating range from 50 to 5000 psi. The on-off differential is adjustable and ranges from 5 to 50%. A welded SAE 4130 steel diaphragm makes this possible. Diaphragm can be constructed to withstand a bursting pressure in excess of 15,000 psi.

The Hydtrol is applicable to the control of high-pressure hydraulic systems containing flammable liquids. Design features 9½ cu. in. of displacement and a weight of 17 oz. Current rating is 10 amp. at 110 v. ac., or 2 amp. at 28 v. dc.



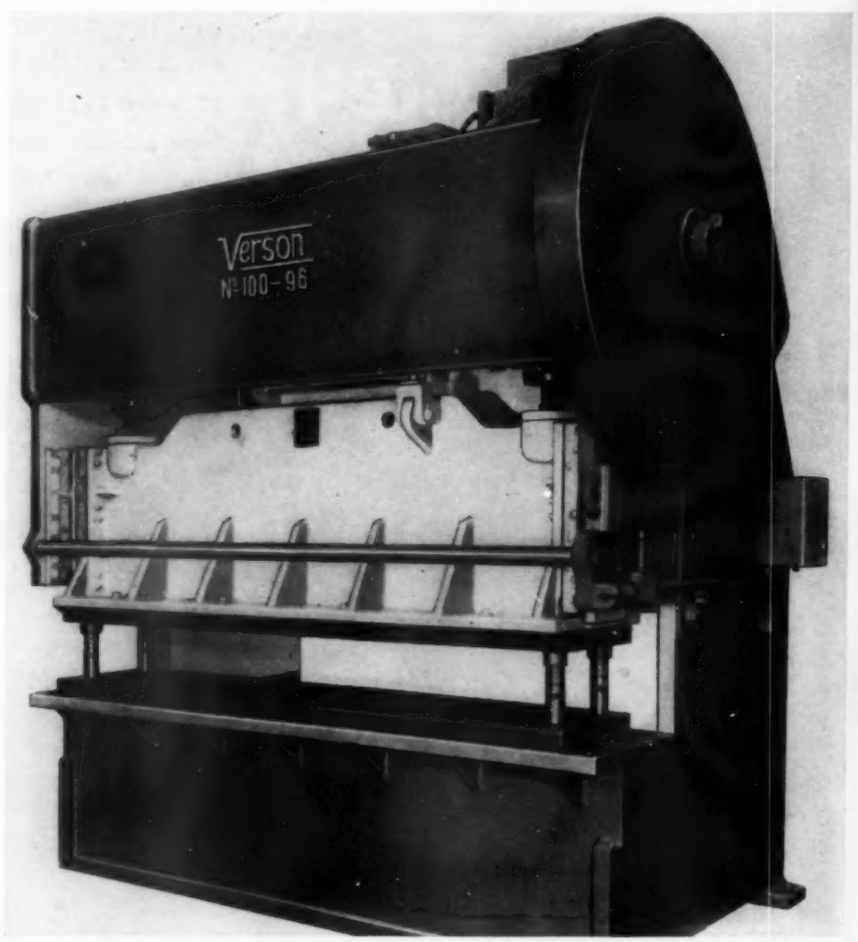
PLATFORM Worksaver, made by Yale & Towne Mfg. Co., Philadelphia Div., 4530 Tacony St., Philadelphia, Pa., lifts 13-in. to handle diversified skid sizes. The battery-powered hand truck can handle skids ranging in height from 6 to 18 in. Truck has a capacity of 6000 lb.

Standard-Type Fixed Gages Includes Thread, Snap Gages

The Threadwell Tap & Die Co., Greenfield, Mass., offers a line of products consisting of standard, conventional-type fixed gages. Line includes plain plug and ring gages, thread gages, snap gages, dial-indicator snap gages and special fixed-size gages.

Lufkin Adjustable Parallels Lock to Micrometer Measure

Adjustable parallels in sets, for layout, gaging, and checking work, are offered by The Lufkin Rule Co., Saginaw, Mich. Parallels can be adjusted to and locked to micrometer measurement and are adjustable to any size within the range of ⅜ to 2¼ in. Thickness of all sizes is 9/32 in. They are available individually or in sets and are packed in a leatherette case.



GANG PRESSES ranging in tonnage capacities from 100 tons to 350 tons in bed lengths from 72 in. up, are made by Verson Allsteel Press Co., 1355 East 93rd St., Chicago 19, Ill. Presses are designed for blanking, forming, punching, shallow drawing, and multiple operations whereby a series of operations can be done in one handling. Presses are pushbutton controlled

"Hearing is Believing"

THAT

AMERICAN PHILLIPS SCREWS

Cut Costs...Kite Sales

...when you listen to makers of Electronic Products like these:

4-WINGED DRIVER CAN'T SLIP OUT OF PHILLIPS TAPERED RECESS

HOW THEY CUT COSTS: Says one hearing-aid manufacturer, "American Phillips Screws save us as much as 50% in time alone — and what they've saved us by banishing spoilage runs into even *more* money!" Simply because American Phillips Screws can't slip, can't slash, *can't drive any way but straight*. And because they're so much easier to handle, aim, and drive . . . without "dropsy."

HOW THEY KITE SALES: American Phillips Screws give all types of products a smart new look . . . a strikingly improved appearance over ugly, burred, slotted screws. And when you really *merchandise* their better holding power and greater vibration-resistance —which add up to fewer servicing needs — you've got an earful that drives home more sales. Find out what American Phillips Screws can do for *your* product. Write.

AMERICAN SCREW COMPANY, PROVIDENCE 1, RHODE ISLAND

Chicago 11: 589 E. Illinois St. *Detroit 2:* 502 Stephenson Building

AMERICAN PHILLIPS *Screws*

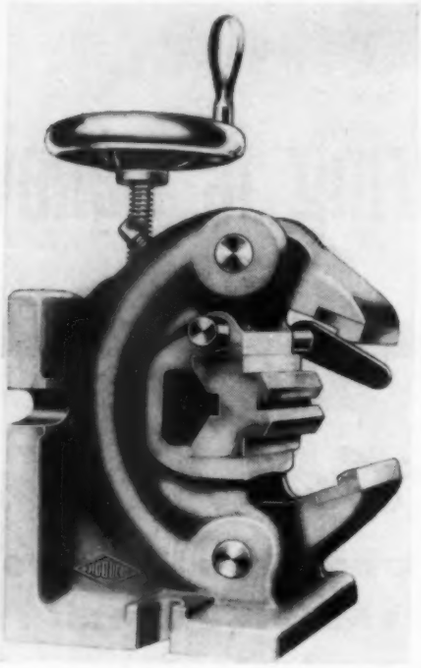
ALL TYPES

ALL METALS: Steel, Brass, Bronze, Stainless Steel, Aluminum, Monel, Everdur (silicon bronze)

SPRING AIR PRESS, designed to cover entire range of foot- or kick-press operations is offered by Winter Products, Inc., 189 State St., Bridgeport 3, Conn. Machine features adjustable strength of blow, squeeze action with controlled speed, adjustable throat height, and adjustable hold-down finger. The standard spring is rated at 200 lb. per in. of compression. Maximum blow is approximately 6400 lb. through a working distance of 1/16 in. at the bottom of the stroke. The maximum stroke is 2 in.

Motor-Control Center by G E Allows Connections from Front

A motor-control center for controlling any number of motors rated up to 200 hp. at 440 v. from one central location is offered by the Control Div., General Electric Co., Schenectady 5, N. Y. Control centers are designed so that all connections can be made from the front, permitting the centers to be lined up against the wall or in back-to-back position. The sections are 90 in. high, 20 in. wide, and 12 in. deep. The starters are furnished in five sizes.



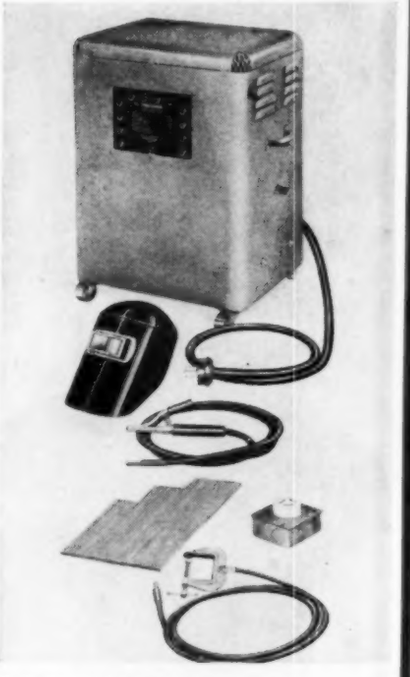
SELF-CENTERING vise which can be mounted for both vertical and horizontal use, is made by The Producto Machine Co., Bridgeport, Conn. It holds shafts or spindles ⅜ to 3⅛ in. in diameter in 4¼-in. jaws for machining keyways, slots or splines. The vertical base is 8x5½ in.; horizontal base, 8x7½ in.; maximum height including screw and handwheel, approximately 13½ in.

Cluster Diamond Dressing Tool Incorporates 20 Small Diamonds

Cluster-type diamond dressing tool, available in two styles, R 20 and R 20-15, is made by Clipper Diamond Tool Co., Inc., 21 West 46th St., New York 19, N. Y. Tool has twenty small diamonds symmetrically inserted in a matrix and arranged in two circles of ten diamonds each. The R 20-15 tool is designed so that the two circles of diamonds are set at 15 degrees. When dressing the wheel three to five diamonds contact the wheel. After they become worn, tool is turned 45° to expose new points. Procedure is repeated until all diamonds are worn beyond use.

Johnson Metal Cut-Off Band Saw Cuts Metals to 5x10-in. Capacity

A horizontal band saw, the Model B metal cut-off band saw, is offered by Johnson Mfg. Corp., 624 Chrysler Bldg., New York 17, N. Y. Machine is designed to cut metals up to a capacity of 5x10 in. The bed is 7x28 in., and is set on a three-point base to give support free from torsional strain. Machine operates and shuts off automatically. There are three blade speeds: 45, 90, and 150 fpm. Net weight of machine is 235 lb. Complete Model B saw including hydraulic control, stock stop gage, and 1/3-hp. motor is priced at $225.



EIGHT welding units are announced by Foster Mfg. Co., One Kinsey Ave., Buffalo 17, N. Y. Welders are recommended for automotive and general industrial maintenance, repair and production welding. Prices range from $39.50 to $225. list, complete with accessories and helmets

"A carbide die is like a cigarette!"

"YEP," says the wise die-room foreman, "the simpler carbide sheet-metal dies and a cigarette have one thing in common:

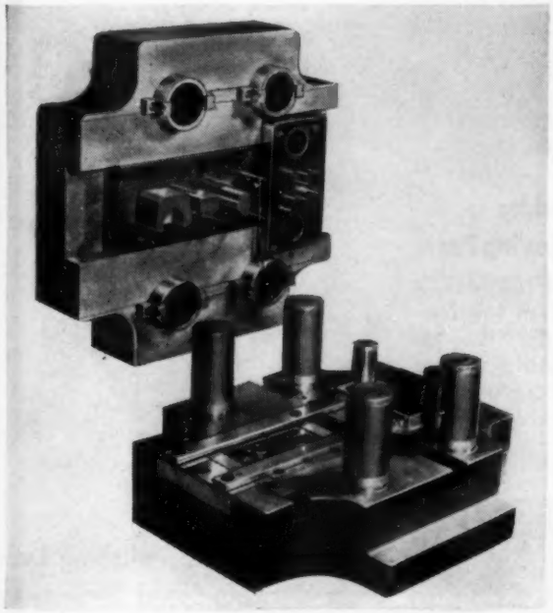
"It's cheaper, by a long shot, to make your own!

"Take the big cylinder-drawing die pictured below, for example. Think how much cheaper it would be to order just the molded, unfinished insert of Carboloy Cemented Carbide for a die like this—and assemble and finish the die in your own shop!

"It's not at all difficult, either.

"Follow the suggestions in the Carboloy DIE ENGINEERING MANUAL, and you'll find it *easy* to make these savings —not just by making your own new dies, but by converting your tool-steel dies to Carboloy, and replacing worn nibs yourself.

"The Carboloy manual will help you apply, design, fabricate and maintain your sheet-metal dies and punches at a much lower cost."



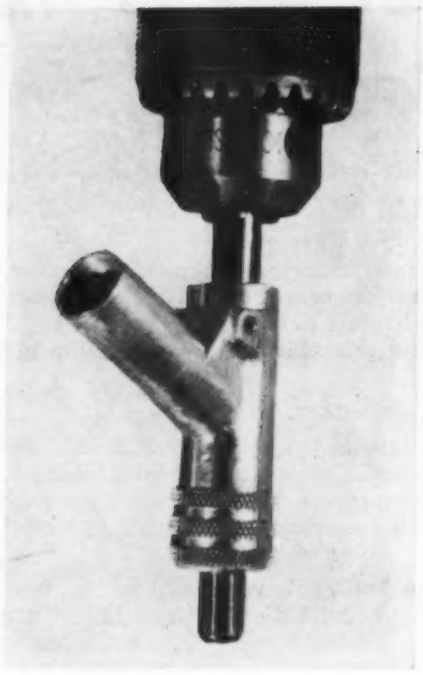
A complex die like this calls for the knowledge and ability of a professional die shop. This five-station progressive die produces a rotor and stator lamination with each stroke of the press. Ask your die maker about Carboloy Cemented Carbide. It means longer life and closer tolerances for this complicated type of die.

Write for your free copy of the 36-page DIE ENGINEERING MANUAL today. And if you need any further assistance, ask us to send around one of our engineers to help you with your problem.

Without cost or obligation, of course.

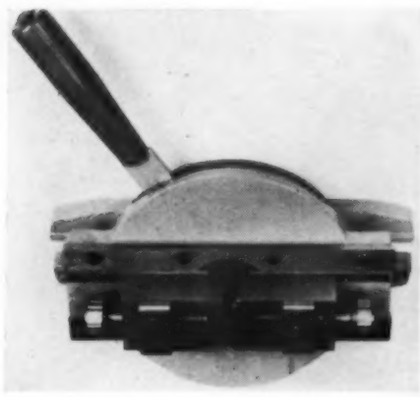
CARBOLOY COMPANY, INC., 11149 E. 8 Mile Ave., Detroit 32, Michigan

CARBOLOY®
CEMENTED CARBIDE



Precision Locating on Lathes Accomplished by Center Scope

Center Scope Products, 3829 San Fernando Rd., Glendale 4, Calif., offers the Series M center scope with a body length of 2¾ in. and a shank diameter of ⅜ in. by 1 in. long. Center scope is used for precision-locating needs on lathes, drillpresses, jig borers, and vertical boring mills. Model is priced at $24.50.



Locking and Automatic Centering Done by Double-Cam-Actuated Vise

A double-cam-actuated vise for milling, drilling and threading operations is offered by Nutmeg Tool & Products, Norwich, Conn. The vise locks the work with one motion of the handle, automatically centers the work regardless of dimensional variation and releases the work and removes the chips with return motion of the handle.

The vise has an adjustable jaw opening and is said not to require lubrication. Special jaws are available for specially shaped parts and a 3-in. hole through the center of the vise allows the work to drop into a tote box. Model is made in two sizes.

Plug-In Portable Arc Welder Designed with No Moving Parts

Electric Arc, Inc., 152-162 Jelliff Ave., Newark, N. J., offers the Nu-Arc welder, redesigned with no moving parts. The portable welder is built for general-purpose use and is a plug-in type with multiple-stage heat ranges.

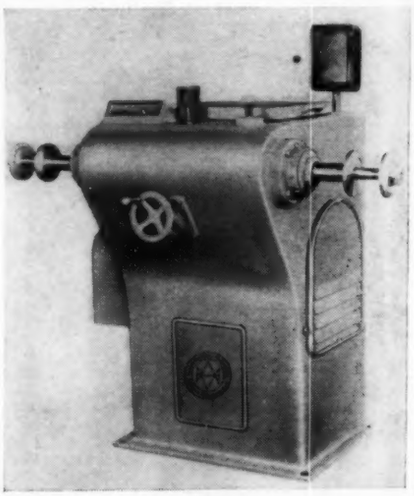
Engis Sensitive Precision Levels Check Horizontal, Vertical Planes

A line of sensitive precision levels is offered by Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill. Levels can be used for checking vertical and horizontal planes or can be incorporated into other instruments or equipment.

Also offered is a line of instruments to determine and check angles or inclined surfaces. Called Clinometers, instruments range from pocket-size devices to high-precision type of instrument.

Ejector-Tool Carbide Insert Offered in a Larger Length

Standard carbide inserts 1½ in. long are offered by Super Tool Co., 21650 Hoover Rd., Detroit, Mich., on their vertical ejector-type tools. The longer-length bit offers approximately 12 additional grinds under normal conditions. Length applies to complete line of standard vertical ejector carbide-tool bits, including the square, round, triangular and rectangular shapes.



Type MS and MI Polishing Lathes Have Variable-Speed Arrangement

The Type MI and MS polishing lathes, made by Hanson-Van Winkle-Munning Co., Matawan, N. J., can now be supplied with a variable-speed arrangement. A handwheel permits choice of any speed between 1800 and 3600 rpm. Spindle speed is governed by a variable-pitch motor pulley and a single, wide V-belt. The calibrated control moves the motor and pulley assembly which changes drive centers, with the belt tension automatically maintained. Magnetic starters are supplied for all variable-speed lathes. Machine is built into a welded-steel base. Spindles turn in pressure-lubricated self-aligning ball bearings. The variable-speed arrangement increases flexibility and range of products on which machine will operate.

Cuts Beam Cost $2.57 to 71 cents with Arc Welding

By G. C. Welland
The Schaffer Poidometer Company
Pittsburgh, Pa.

SUBSTANTIAL savings in manufacturing costs are readily possible through a careful design study of component parts for arc welded construction. This fact is well supported by our recent experience with a scale beam originally costing us $2.57 to produce. Redesign for arc welded assembly has cut the cost to 71 cents, and the weight 25%. In addition, the performance of our product has been improved and the appearance greatly enhanced for better sales appeal.

Our product, the Poidometer (Fig. 1), is a continuous weighing machine. It incorporates a moving belt carrying the material to be weighed. A roll directly below the conveyor belt takes the direct load of the material, transmitting the load force to a balance scale through a beam member (Fig. 2) acting as a fulcrum.

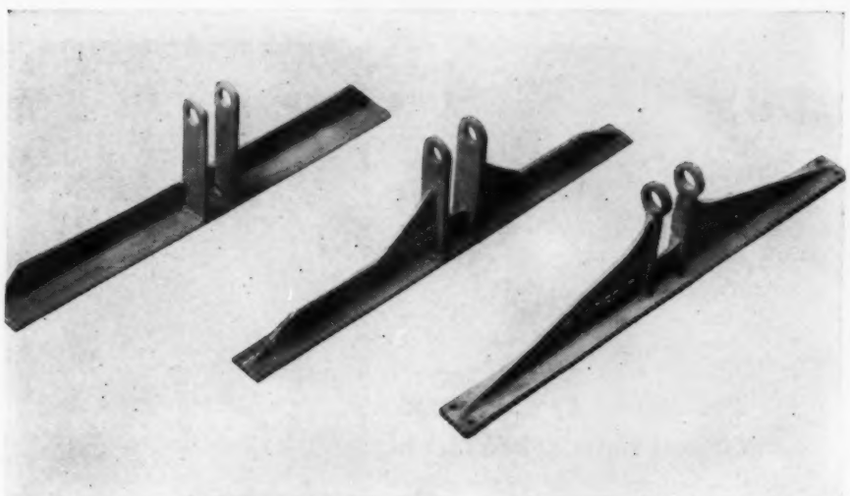


Fig. 2. Progressive redesign of scale beam to welded construction. Right: Original beam . . . Cost $2.57. Center: First design change . . . Cost $1.63. Left: Present design . . . Cost 71 cents.

Pressed with a demand urgency for our weighing machines during the recent years plus a supply problem of securing parts for our original construction, led us to redesign the scale beam member. The first redesign followed the pattern of the original casting shape and cut the manufacturing cost of this scale beam from $2.57 to $1.63.

Further study of this component part along with the suggestions of a Lincoln design engineer, prompted a second change. This change greatly simplified our design by incorporating two formed steel straps arc welded to an angle piece as shown in Fig. 2. With this latter design, our production cost is cut to 71 cents and a weight reduction is made from an original 10 pounds to 7 pounds.

In addition to the above savings, the change to welded construction eliminates 0.28 man-hours per beam for several machining operations that are now cut out entirely.

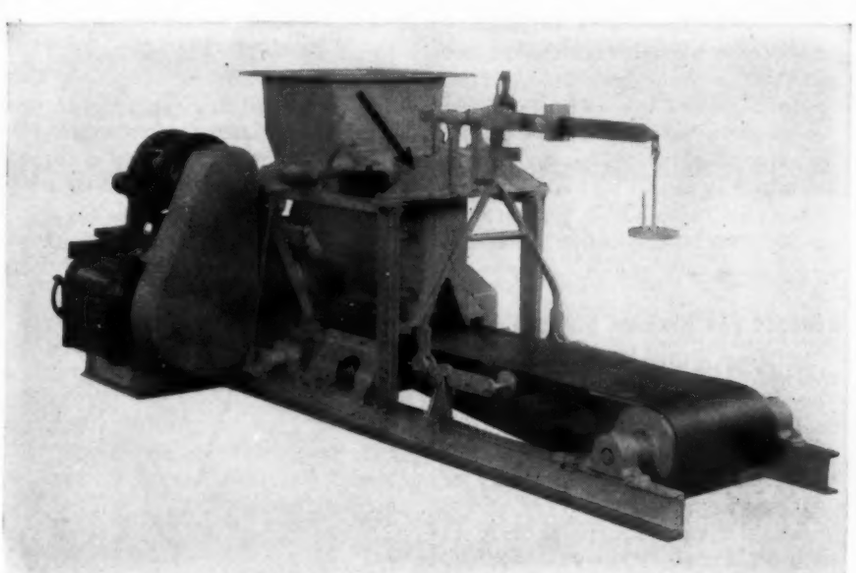
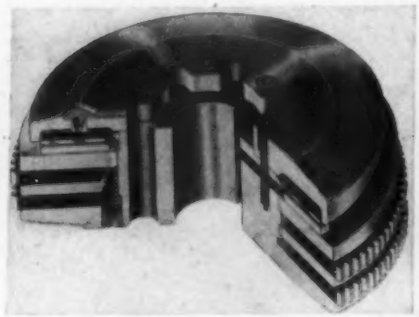


Fig. 1. The Schaffer Poidometer continuous weighing machine. Arrow shows scale beam of former construction.

The above is published by LINCOLN ELECTRIC in the interests of progress. Machine Design Studies are available to engineers and designers. Write The Lincoln Electric Company, Dept. 36, Cleveland 1, Ohio. **Advertisement**

Parts and Materials



Pressure Applied by Compressed Air to Engage Plates on Disk Clutch

A friction clutch for heavy-duty application is introduced by Wichita Falls Foundry and Machine Co., Wichita Falls, Texas. Called the Wichita air-tube disk clutch, it features direct-axial pressure application by compressed air in a flat, circular, rubber and fabric air tube to engage the plates of a single- or multiple-plate disk clutch.

Clutch is said to be unaffected by centrifugal force. No diaphragms, packing or gaskets are used. Tube is insulated from heat, and air-cooling passages help keep the clutch cool. Clutch is available in 18-, 24-, and 30-in. single- and double-plate sizes, having horsepower capacities from 40 to 1000 hp. Other sizes will be available later.

PADDED PUSHER with a long bearing surface is made by Sheffer Collet Co., Traverse City, Mich. Called the Better Bearing Master pusher, the model has external threads ground from the solid to assure concentricity. Pads can be changed to handle stock of various sizes

Hydraulic-System Control Center Exerts Precision-Controlled Force

A control center for hydraulic systems called the Powerpak is marketed by Electrol, Inc., Kingston, N. Y. It is capable of exerting precision-controlled forces by finger-tip actuation from zero to a maximum operating pressure of 1500 psi. The Powerpak consists of a hand pump, reservoir, two selector valves, and relief and check valves. Model stands 4½ in. high, and has a 3½x4-in. base. A power-driven pump can be utilized by removing two plugs to connect the pump pressure and suction lines to the unit. The N.P.T. ports can be modified to suit individual needs.

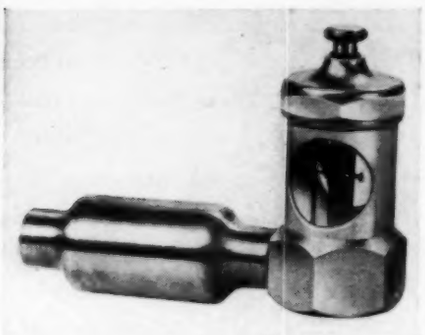
Process for Making Sample Molds Utilizes a Rubber-Like Material

The Prodel Process utilizes a soft rubber-like material for the original mold from which castings of Bakelite resins can be made. Process was developed from making sample molds and designed to provide intricate shapes without expensive tooling. Tolerance of ±0.005 in. can be held, and reverse draft or undercuts can be removed from the mold.

Offered by Product Technicians, Inc., 65 Broad St., Rochester 4, N. Y., the base materials used are primarily phenolformaldehydes, cured with temperature only. They are thermo-setting and can be had in a variety of colors. An original pattern is made, preferably of metal. The mold will pick up very intricate detail so the original is finished exactly as the final parts are desired.

Prodel cast resins are designed for making a small number of parts cheaply, and offers a method of obtaining a small quantity up to approximately 5000 parts.

Plastics are non-flammable, are said to machine easily, and to be unaffected by organic solvents and most inorganic solvents.



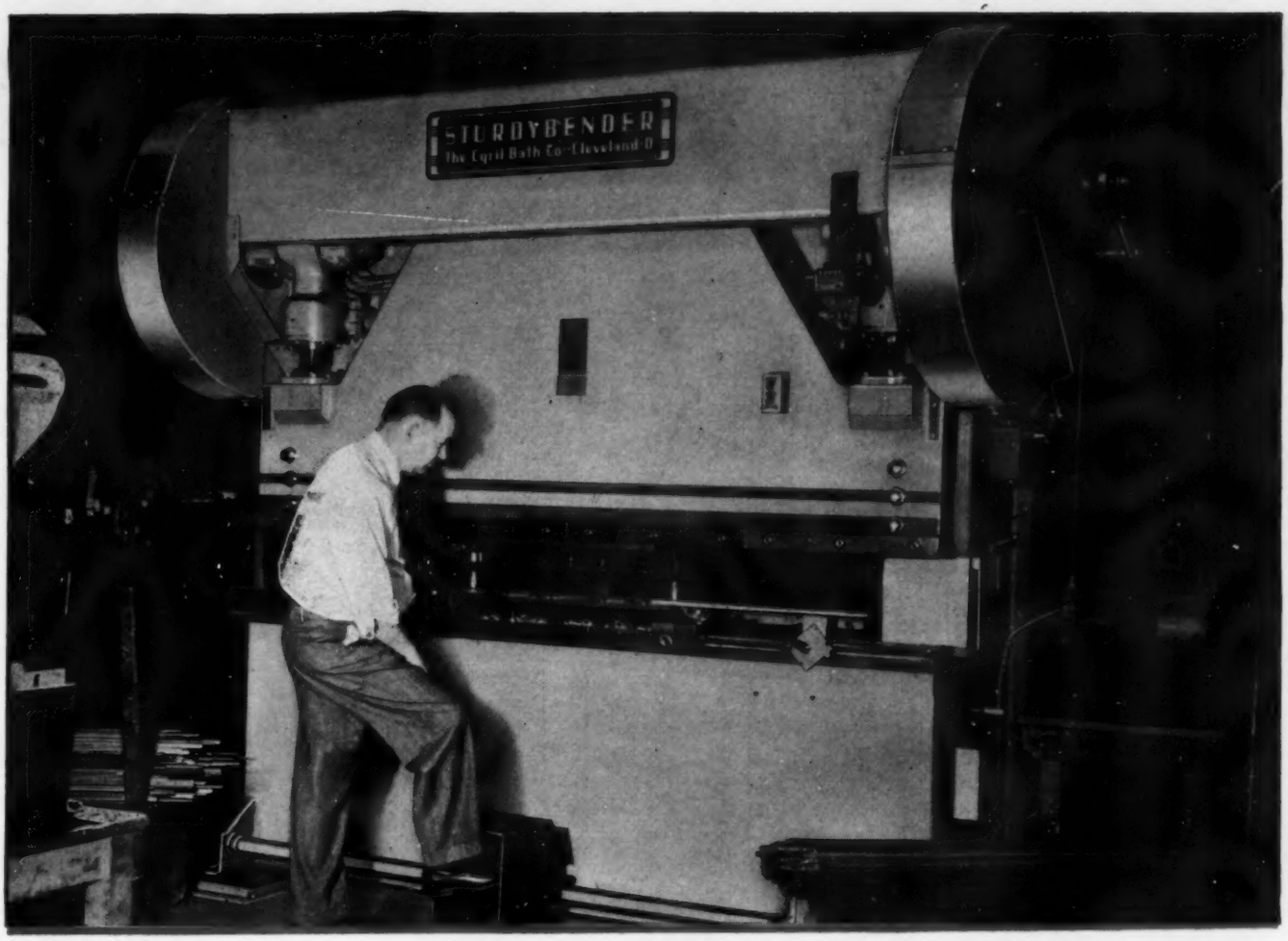
Combination Lubricator, Filter Protects Air-Driven Equipment

Combination lubricator and filter, the Lubri-Filter, designed for compressed-air lines, is introduced by Jarett Compressor & Equipment, Inc., 275 Central Ave., Newark 4, N. J. Lubri-cleaner is said to protect air-driven equipment against "dry-running" breakdowns and impurities in the air supply.

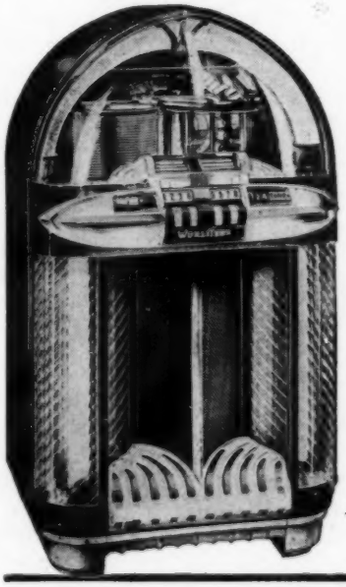
Air is cleaned automatically by a permanent-type, cleanable-filter element, said not to require replacement. Atomized oil is automatically injected into the air line. Oil level can be seen from any angle. The Model 605 provides an unrestricted air flow of ¼ ipt.

Sawdust for Drying, Polishing Available in Variety of Meshes

The Kube-Kut sawdust for drying and polishing metals and other materials is marketed by Michael Wood Products, Inc., 625 Midland Ave.,



Longer Pieces—Less Handling—Plus Perforations are STURDYBENDER Advantages *for Rudolph Wurlitzer*



● This is a STURDYBENDER Press Brake in operation at the Rudolph Wurlitzer plant in North Tonawanda, New York. The company reports it enables them to use longer pieces, reduce handling and do perforating operations without time lag.

The Light Shield shown above and used on both sides of the Wurlitzer cabinet, is made of hot rolled steel, S.A.E. 1010, ⅛" thick. Original material comes flat. STURDYBENDER forms the shield and perforates 12-3/16" diameter holes in two stages.

This STURDYBENDER is in operation 12 hours a day, speeding up production of metal parts for phonographs and organs built by the Rudolph Wurlitzer Company. This is but one of hundreds of STURDYBENDER Press Brakes that have proved to be steady profit builders in all types of metal working plants. Write for literature.

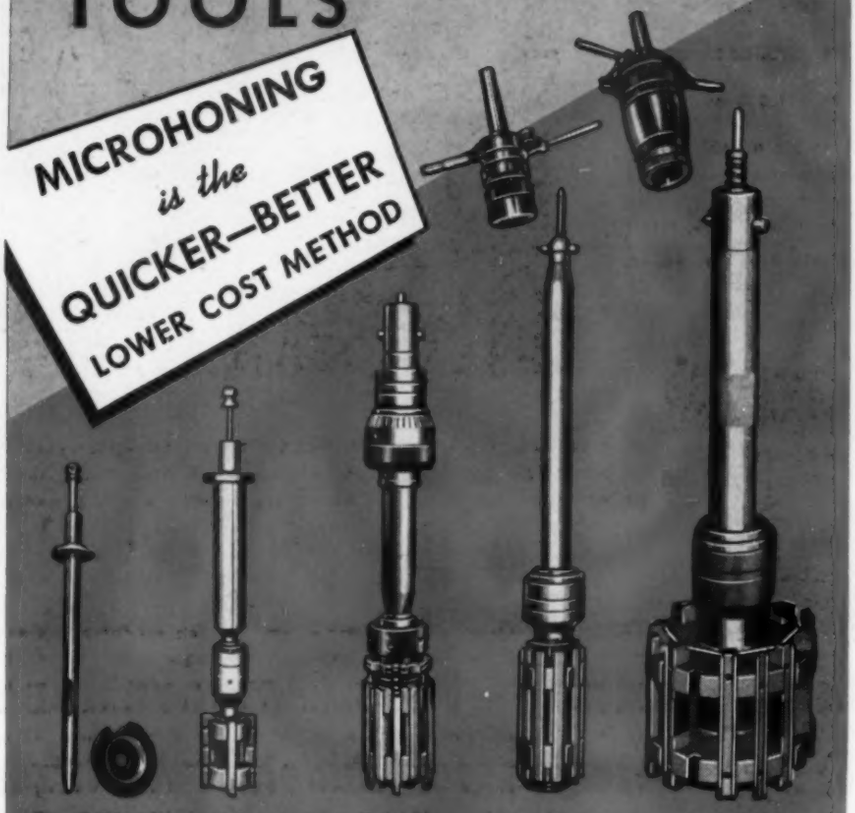
THE CYRIL BATH COMPANY

6910 Machinery Avenue, Cleveland 8, Ohio

For Round and Straight Bores Uniformly Sized and Finished

MICROHONING* TOOLS

MICROHONING *is the* QUICKER—BETTER LOWER COST METHOD


Microweld* Tool and Microsize* Ring
General Purpose Microhoning Tools
Hydraulic Tools
Brake-Type Tools and Adjusting Head
Hydrabrake* Tools with Adjusting Head

MICROMATIC MICROHONING TOOLS

in the range of bore diameter sizes from ¼" to 42", and up to 75 feet long, correct error and generate final roundness and straightness within limits of .0001" to .0003", either by AUTOMATIC or operator control—remove up to .080" stock at rates up to .012" per minute on diameter—and any desired type of surface finish. They are designed and constructed to meet the needs of economical precision production. We can mail further information.

*Trademark Reg. U.S. Patent Office.

MICROMATIC HONE CORPORATION

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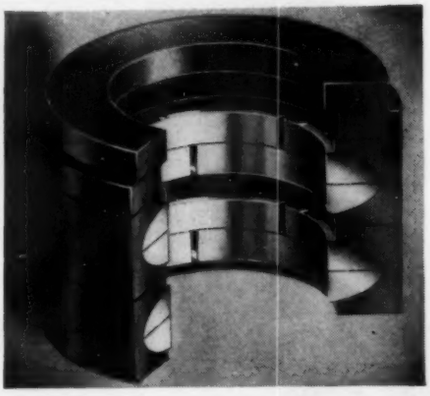
Los Angeles, Calif. • Houston, Texas • Rockford, Ill. • Guilford, Conn. • Brantford, Ont., Can.

Dept. MF, Garfield, N. J. It is made from green-maple sawdust at logging operations. The absence of elongated slivers makes this material easy to shake free from products. Material does not pulverize readily in tumbling processes, and is said not to create a film on the surface of the material being dried or polished.

Kube-Kut is available in different types of meshes and is packed in 50-lb. bags.



Monopak Hydraulic Packing Seals Against Liquid, Gas

A hydraulic packing, called Monopak, used for sealing various liquids and gases throughout a wide range of temperature and pressure, is offered by Hydraulic Accessories Co., 439 E. Fort St., Detroit 26, Mich. Designed for standardization of maintenance, packing is said to withstand temperatures from —50 to 300 F., and to resist pressures from 0 to 3000 psi. Packing is said to be effective on either reciprocating or rotating surfaces.

Each sealing element is composed of two staggered split-rings, cushioned in a ring of resilient synthetic rubber. Monopak is packaged in individual sets and can be obtained in any size desired from ½-in. I.D. to 36-in. O.D.

Belt for Power Transmission Features Nylon Reinforcement

A nylon-reinforced V-belt, claimed to have twice the strength of conventional V-belts, is introduced by the United States Rubber Co., Rockefeller Center, N. Y. Called the U.S. Royal Super Service V-belt, it contains a series of tough nylon cords covered with a special synthetic rubber compound capable of withstanding the deteriorating effects of heat and oil. Belt is recommended for power transmission on equipment subject to rough usage.

Central system clarification of coolants gives.... 6 money-saving advantages

A central system featuring Honan-Crane Automatic Clarifiers and Houdaille Conveyors delivers a continuous flow of clean coolants to any number of machine tools. Chip and contamination disposal problems are fully solved. Operating economies more than justify the expenditure for this equipment.

NOTE: Other types of central systems for cutting oils, hydraulic oils, rolling mill oils, etc., feature Honan-Crane Purifiers, Filters and other items of equipment. Write for case histories on actual installations.

1. Increases tool life
2. Eliminates Individual machine tool coolant pumps and motors
3. Better finishes with fewer rejects
4. Eliminates labor necessary to clean individual machine tool sumps and lines
5. Extends coolant life thereby relieving disposal problems
6. Better control of Dermatitis problems

HONAN-CRANE AUTOMATIC CLARIFIER... This clarifier removes abrasives, dirt and other solid contamination from water soluble coolants used for grinders, broaches, boring machines, milling machines and other metal working machine tools.

THE *Houdaille CONVEYOR... This effective conveyor is the final step in eliminating manual labor requirements for oil and coolant clarification systems. The chain and flights which travel through standard 2″, 4″ or 6″ pipe are routed along the bottom of a V-shaped settling tank. An open section of pipe is employed at this point. Chips, sludges and other contaminants are collected, as they settle, and are transported over any required route of travel to a hopper for disposal. A sludge cart may be used to move the sediment for final disposition. Flights are neoprene, steel backed. The conveyor is driven by an electric motor, through reducing gears.

*Pronounced Hoo-dye

ONAN-CRANE CORP

205 WABASH AVENUE • LEBANON, INDIANA

- ☐ Please send actual case histories on Central Systems for _____ (Oils or Coolants) for _____ (Type of operation)
- ☐ Please send complete information on Automatic Clarifier
- ☐ Please send complete information on Houdaille Conveyor
- ☐ Please have a salesman call

Name _____

Company _____

Address _____

City _____ State _____

A SUBSIDIARY OF
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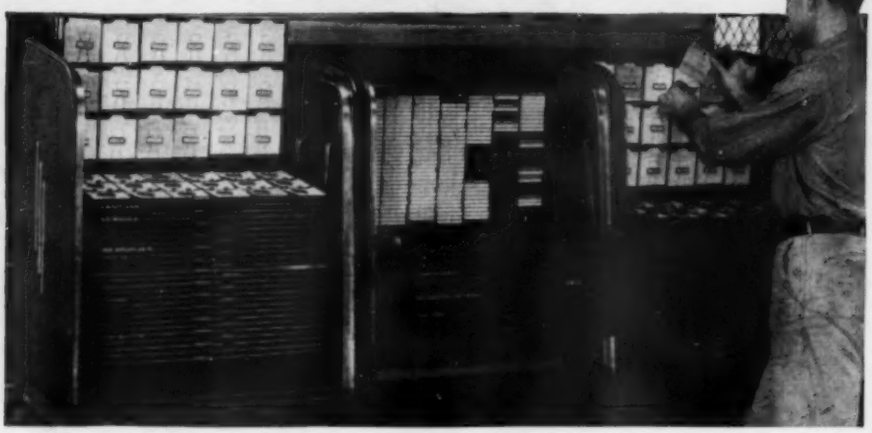
CUT YOUR TOOL INVENTORY AND LOSSES...



. . . Skinner Chuck stopped 'em and job delays, too, with McCaskey

No one wants to run up costs by carrying more tools than necessary in tool crib inventories. But . . . how be sure that you have enough to serve daily production needs . . . and not too many?

The Skinner Chuck Company, New Britain, Conn. found the answer and made these and other definite savings thru McCaskey Tool Crib Control, according to Clifford L. Nelson, General Foreman:

(1) A large reduction in inventory carried in the tool crib . . . with more tools actually available for use than before;

(2) Inventory and Activity records prevent having to hold up jobs waiting for the purchase of tools;

(3) Employees like the McCaskey System because there can be no question about the tools they are responsible for and no arguments when they are returned;

(4) All tools are quickly located whether in use or in the crib saving time for planners, supervisors, operators, and machines;

(5) A large reduction in tool breakage and total elimination of loss of tools, that formerly disappeared in the scrap can, results from having complete accountability and knowing the reasons for tool breakage.

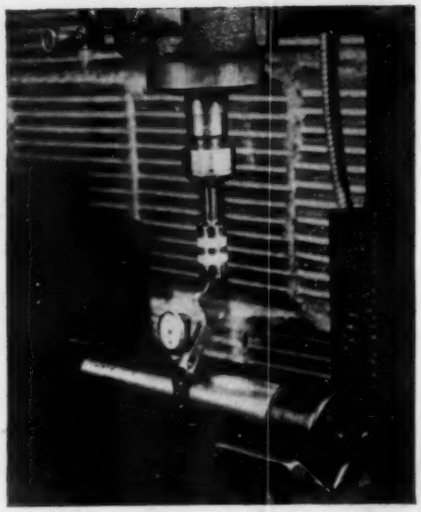
Let us have a qualified representative explain how McCaskey Control will save from the start in YOUR plant . . . or send you proof of McCaskey savings in several other well-known plants.

McCaskey INDUSTRIAL CONTROLS

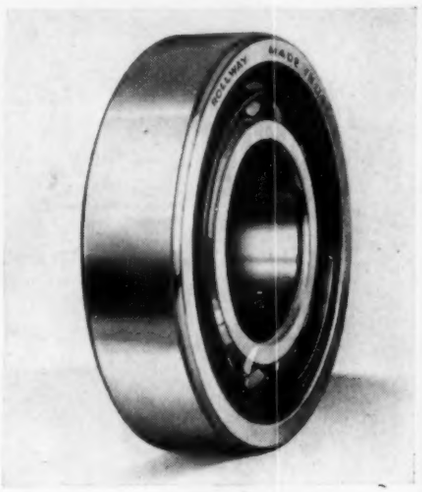
PRODUCTION • INVENTORY • TOOLS • COSTS • PAYROLL

THE McCASKEY REGISTER COMPANY, ALLIANCE, OHIO

McCaskey Systems Ltd., Galt, Canada — The McCaskey Register Co., Watford, England



INDICATOR HOLDER, made by Phillips Bros. Screw Products Co., 124 S. Howard Ave., Lansing, Mich., is the universal type. The arm holding the indicator can be turned 360° in its holder and can swing 90° either side of center. Arm is guided by a slot that facilitates keeping indicator on center during process of changing radius setting



Rollway Cylindrical Bearings Offer One-Piece Steel Retainer

A precision cylindrical roller bearing with a steel retainer is offered by The Rollway Bearing Co., Inc., Syracuse, N. Y. Called Tru-Rol, the bearing features a one-piece steel retainer with pockets having double flanges or guide lips to keep rollers in alignment. The outer race has deep ring grooves in the inside diameter into which fit snap rings that keep the retainer and rollers in the outer race. The inner race is separate and is interchangeable. The bearing can be used with or without the inner race, depending on the application. Bearings are offered in a range of sizes conforming with S.A.E. standards.

Save

TIME AND MONEY WITH THIS NEW WHISTLER U-375

Adjustable Perforating Die Set

A MONEY-SAVING opportunity to prove in your own plant the many advantages of Whistler Adjustable Dies. Now being employed by thousands of metal working shops. The compact design of this special U-375 unit (10″ x 12″ working surface) provides up to 25 holes, 1/32″ to 3/8″ diameter. Pierce materials up to and including 1/16″ mild sheet steel... in one operation. Minimum centers of 7/8″ are permitted. Set-ups are made quickly and into production within hours. Precision perforating on long or short runs at much reduced expense. Re-use of punches and dies writes off first cost. The U-375 unit is shipped complete ready for immediate set-up.

Special Introductory Offer

To prove the advantages of Whistler Adjustable Dies under your production conditions, we are offering these U-375 units at a special low price.

- 1 DS-1012-1 (10″ x 12″) T Slotted Die Set
- 12 DR-375 Die Retainers
- 12 PR-375 Punch Retainers
- 12 PU-375 Round Punches
- 12 DBU-375 Die Bushings
- 12 S-375 Strippers
- 12 LLP-375 Locating Pilots
- 4 GA-375 Standard Gauges
- 1 SUP-375 Set-Up Plug

Punches and dies are your own selection of sizes from 1/32″ up to 3/8″ diameters. Everything needed to start production is included.

Shipped complete upon receipt of your order for only... **$280**

Net F.O.B. Buffalo, N. Y.

◀ SENT FREE ON REQUEST

Special U-375 Booklet and General Catalogs.

In brief informative style, with clear-cut illustrations, this literature gives complete details about Whistler Adjustable Dies. Write today.

S. B. WHISTLER & SONS, Inc.

758 MILITARY ROAD, BUFFALO 17, NEW YORK

"KEX" Industrial Wiping TOWELS

New Atlanta Ford Plant Joins Ranks of "KEX" Users

THIS is the latest of the many Ford Motor Company plants to select KEX Industrial Wiping Towels because they work so efficiently at low cost.

"KEX" National Service is available for all types of industry in every section of the country. This service consists of a simple, quick and logical way to rent industrial wiping towels of uniform quality—made for the use to which you put them.

They are delivered in any quantity to suit the individual requirements of your plant . . . and are exchanged at regular intervals to insure an adequate supply of clean towels. They come in neat, easily handled bundles that help control distribution. Every towel is thoroughly cleaned and inspected before delivery.

Follow the lead of industrial leaders who overlook no opportunity to keep operating costs down—and efficiency up!

Nothing to Buy—No Expensive Inventory—Just a Low Monthly Rental. The first month should show a decided saving on wiping costs.

For complete information, see your classified Telephone Directory for nearest KEX distributor, or write KEX NATIONAL SERVICE, 295 Fifth Avenue, New York 16, N.Y.

"KEX" NATIONAL SERVICE

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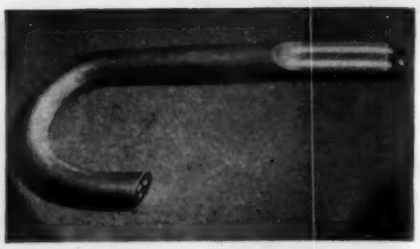


Tri-Core Acid-Filled Solder For Stainless Steel, Monel

The Tri-Core Leakpruf Acid-filled solder is offered by the Solder Div., Alpha Metals, Inc., 363 Hudson Ave., Brooklyn 1, N. Y. Featured is the ability to solder stainless steel, monel, and nickel. Solder has three cores and uses a synthetic acid said to be more active as a flux than zinc chloride and half as corrosive. The chalk-like, non-liquid acid flux is soluble in water. A definite soldering sequence is automatically developed by three cores of flux.

Solder is packaged in 1-, 5-, and 20-lb. spools. The first two are shipped in 50-lb. cartons, 50 and 10 spools to a carton, respectively. The 20-lb. spools are shipped 2 and 3 to a carton.

Corrosion Inhibitor in Vapor Form Odorless, Non-Injurious to Skin

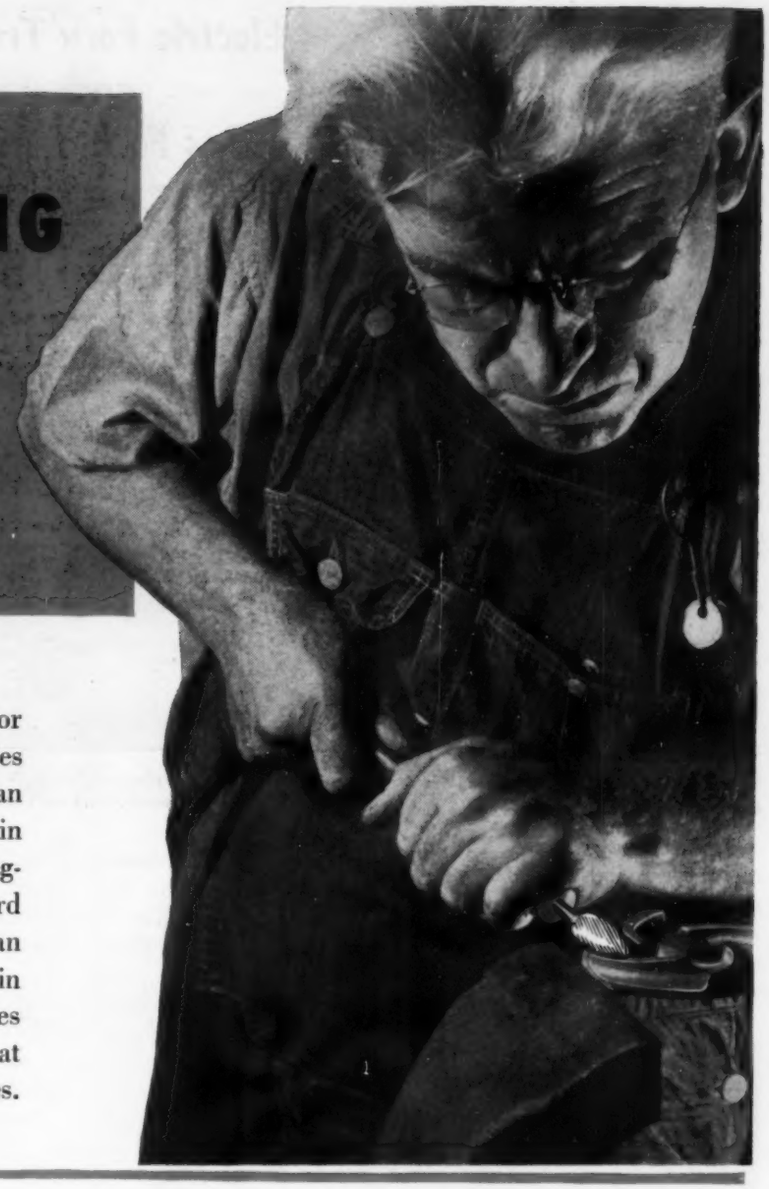
A synthetic-chemical corrosion inhibitor is offered by Charles Stevens & Co., 2018-24 Crotona Parkway, New York, N. Y. The compound slowly vaporizes and surrounds ferrous material such as iron and steel, preventing corrosion by moisture and air. An invisible protective film is formed. Inhibitor functions in the presence of moisture and air and not by removing the moisture or oxygen. Listed as CS-CI-501, vapor does not necessarily have to come in contact with the metal directly for protection. The vapor is odorless, nontoxic and non-injurious to the skin.

Tough Thermoplastic Material Features Insulating Properties

United States Rubber Co., Rockefeller Center, N. Y., offers a thermoplastic material known as Versalite. Material is tough, light in weight, non-corrosive and stable under changing atmospheric conditions, and has electrical insulating properties, and a low rate of heat conductivity.

Material can be formed into irregular and compound shapes as large as 5x10 ft., and can be made in almost any thickness above 0.020 in. Cutting, drilling and punching can be done on ordinary machining.

TIPS ON USING ROTARY FILES AND BURS



NICHOLSON spares no care, expense or detail in making the most efficient Rotaries that file engineering and manufacturing can produce. Nicholson is equally interested in your getting the most out of them. The suggestions below should help the user toward best results. Your industrial distributor can give you further helpful service—both in selecting the right shapes, cuts, and sizes for your needs and in supplying them at prices that give you unsurpassed values.

1. Move the file or bur at an even rate and pressure to avoid the "hills and dales" which will show up if an unsteady pressure is applied.

2. The speed at which the file or bur can be driven depends to a great extent on its diameter. The smaller it is, the faster the speed. (We will be glad to meet your request for charts of approximate speeds of high-speed steel Rotary files and Ground Burs and Carbide Ground Burs for general applications.)

3. Be sure to use sharp files or burs. Never overlook the fact that the operator's time is the big cost item, and that he needs well-sharpened tools. (Nicholson provides an excellent sharpening service for burs and a conversion service for making burs from worn Rotary files.)

4. Use a short grip on the shank for accurate control, and a longer grip for reaching out-of-the-way places. Although the standard length shanks will do the majority of jobs, other lengths can be secured for special cases.

5. Normally, medium cut files and burs will give sufficient stock removal and acceptable finish to meet most needs. However, if heavier cutting or stock removal is required, coarse cut should be used; and, correspondingly, the fine cut should be selected if a very smooth finish is required.

6. Excessive pressure shortens bur life and does not materially add to stock removal. Use a firm pressure and allow the tool to do the cutting. Start using a new bur at fairly slow speed, increasing rate gradually as bur is broken in.

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HAND CUT AND MACHINE GROUND • HIGH SPEED STEEL AND CARBIDE

NICHOLSON U.S.A.

MATERIAL HANDLING *News*

Electric Fork Trucks and Gas Fork Trucks — CLARK BUILDS BOTH

It is as true in the field of materials handling as it is in the field of medicine that a completely objective and unbiased approach is essential to any search for facts.

In many installations gas-powered equipment does the best possible job; and Clark gas-powered machines do these "best possible" jobs in the best possible manner. Many gas-powered Clark machines remain in operation after 20 years of continuous service—ample proof of their sturdy excellence.

Gas-powered carloader with HI-LO-STACK clears car doors easily, tiers to 11 feet.

In many other installations it is clear that electric battery-powered machines will serve most efficiently and economically—and in these instances Clark sales engineers recommend Clark electrics.

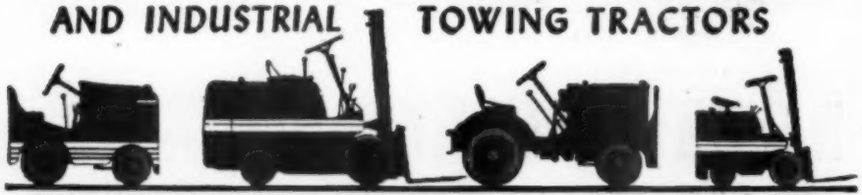
Electric fork truck loads palletized cases of canned goods on trailers.

Clark undertook the manufacture of electric battery-powered fork trucks with a conviction that it could build a better machine than it could find on the market, and at a lower cost. Exclusive initial economies which Clark foresaw and achieved—and which it affords Clark users—resulted from Clark's mass production of both gas and electric machines as well as of most of their major components, and from its unparalleled pattern of parts interchangeability. These are basic advantages immediately apparent to seasoned production men.

It must be equally apparent—that whether Clark's recommendation is for gas-powered equipment or for electric battery - powered equipment, it is based on *facts*, and is free of prejudices arising naturally out of a one-line approach.

We believe that it will pay you to CONSULT CLARK.

CLARK ELECTRIC AND GAS POWERED **FORK TRUCKS**
AND INDUSTRIAL TOWING TRACTORS



CLARK EQUIPMENT COMPANY, TRUCTRACTOR DIVISION, BATTLE CREEK 3, MICH.
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD

ROUND TABLE *Discussion*

LEARN OR EARN?

To some foremen an apprentice is just a confounded nuisance, a burden to be borne, rather than one of the next generation's workmen to be trained. Lads, like Topsy in Uncle Tom's Cabin, quickly sense whether the foreman is friendly or not.

A young apprentice, idling his time enjoying a fine river view, was asked for an explanation. The boy said he had a job he could not manage, and in wasting time he was not wasting material. Asked why he had not sought his foreman's help, the boy said he had and had been told to go and find out. The job was bevel pinions with cast teeth; not an easy job. He was told what to do and was promised help. An hour later, his job was correctly set, his lathe was running, and he was whistling, happy and grateful. The foreman's name must have been Ed.

For an apprentice to learn, he must be taught, and most boys will appreciate real and kindly help. The best boys have an appetite for knowledge and experience; they want to excel, to become as well informed as the foreman. The foreman is a wise man whose treatment of his boys is such that they will seek his advice. They may leave him, but not in the lurch, and sometimes an ex-apprentice will return to a works as a foreman where the Als rather than the Eds were at the helm, but not otherwise.

J. E. Powell
Glos, England

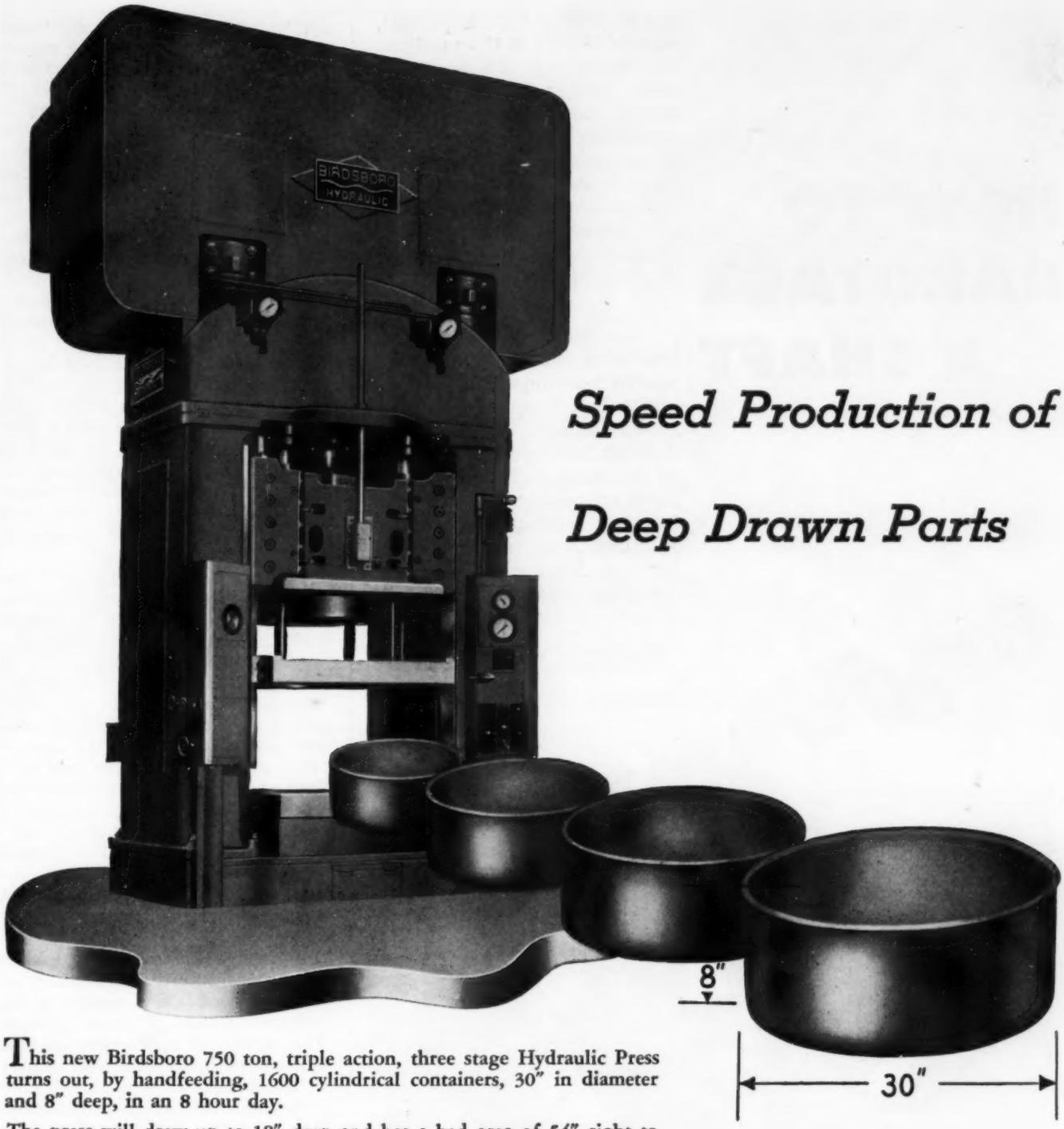
•

The disastrous effect on youth of big money paid, not necessarily earned, during the war period has not yet worn off and may constitute a problem for management and foreman for some time to come.

Here in Britain we know that we cannot expect to return to even an approximation of the wage scales for apprentices in operation before World War II.

Present-day cost of living here, despite widespread price control of the necessities of life, has made the increased scale of apprentice wages necessary in order that boys may be attracted to an apprenticeship, and also in an effort to induce parents to encourage their boys to go in for a skilled occupation.

Even when all the discouraging



Speed Production of Deep Drawn Parts

This new Birdsboro 750 ton, triple action, three stage Hydraulic Press turns out, by handfeeding, 1600 cylindrical containers, 30" in diameter and 8" deep, in an 8 hour day.

The press will draw up to 18" deep and has a bed area of 54" right to left, and 60" front to back. This is just another outstanding example of Birdsboro engineering at work. Our engineers will be glad to work with you on any press problems that may confront you now or in the future.

This versatile press is equally suitable for single and double action drawing operations, as well as blanking and coining. It is also available with built-in equipment for BULGING by "hydraulic pressure."

Agents in: Chicago, Illinois—Cincinnati, Ohio—Detroit, Michigan—Los Angeles, California—St. Louis, Missouri—Tulsa, Oklahoma.

Birdsboro Steel Foundry & Machine Co. • Birdsboro, Pa.

BIRDSBORO
HYDRAULIC PRESSES

Designers & Builders of: Steel Mill Equipment • Rolls • Special Machinery • Crushing Machinery • Steel Castings • Hydraulic Presses

HOW TO SABOTAGE A SHAFT

The crankshaft is an important, expensive part of the modern, high speed engine. It represents many hours of precise, highly skilled workmanship. Yet the crankshaft can be sabotaged in a few minutes . . . if the bearings are not exactly right. In fact, without the right fit, correct alloy and proper lubrication method, excessive wear develops or the bearings freeze to the shaft.

Johnson Bronze knows and appreciates the vital part that sleeve bearings play in any motive unit. Its speed, efficiency and economy of operation depends to a very great extent on the bearings. That is why we insist on quality and precision in every bearing we produce. And that is why so many leading manufacturers depend entirely on Johnson Bronze for all of their sleeve bearings.

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SLEEVE BEARING HEADQUARTERS
BRANCHES IN 20 INDUSTRIAL CENTERS

factors are taken into account, ways and means of attracting the necessary infeed of boys to the skilled trades are still within the reach of enterprising management. Here a note of warning must be sounded. In deciding on the necessary attractions required, the emphasis must, if real success is to be attained, be laid on the word necessary. The writer knows of at least one company who so overshot the mark in the matter of conditions and attractions that, with film shows, lectures and social activities, the lads felt a sense of grievance when asked to put their backs into a bit of honest work. Anything that savors of coaxing youth to serve an apprenticeship must be avoided at all costs if satisfactory results are to be achieved and good craftsmen turned out; the method of approach should rather be to impress them with their good fortune in being in the running of a skilled occupation.

In the large towns here, where the Education Authority has a Careers Council, the officers are in contact with the higher grade schools and run parent-teachers associations at which parents hear talks by all the head teachers. It is from the higher grade schools that boys and girls, who are not going on to the universities, move into industry, and parents who attend these meetings can discuss their children's prospects and choice of occupation with their teachers after the lecture. The teacher advises on the matter of future occupation and can guide students into fields in which their talents will find most scope.

By keeping in touch with leaders of youth organizations, a satisfactory inflow of good lads is assured on the recommendation of those leaders. The subsequent performance of 90% of the boys confirms the high opinion of the leaders.

Success comes from careful selection and the engagement of lads more interested in becoming good craftsmen than in earning big money in their teens at any old jobs. Those to whom big money seems most important are politely advised to seek suitable employment elsewhere.

C. D. Mackinnon
Lanarkshire, Scotland

•

GUARDS OR PROTECTION?

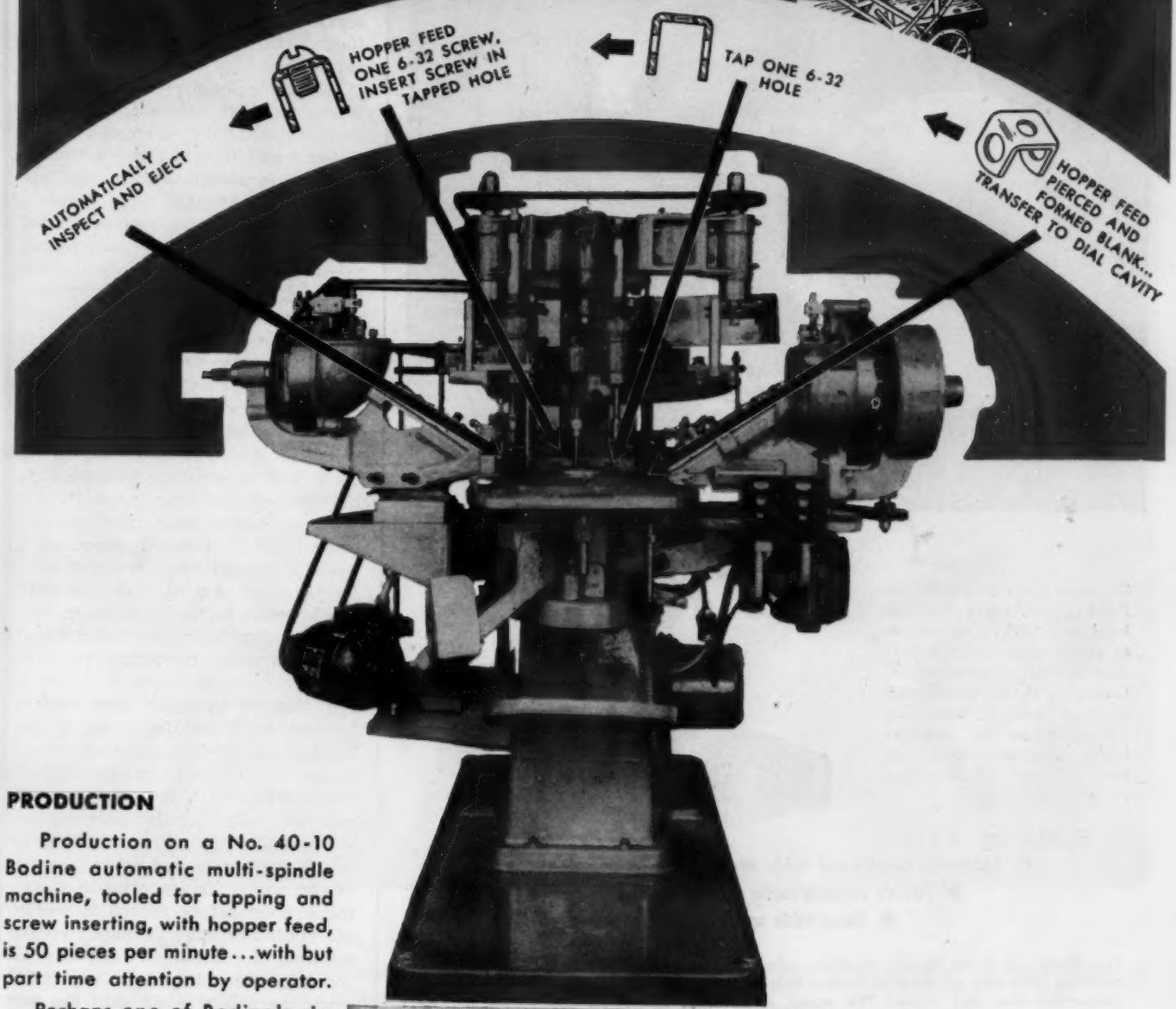
Arbitrarily to limit the application of safety devices on the premise that accidents happen only to incompetent workers is assuming an "Alice-In-Wonderland" attitude that will invite trouble in the shop.

Industrial safety records indicate

CASE HISTORY No. 22

Bodine

PROCESSING A "U" SHAPED COMPONENT OF THE FAMOUS ERECTOR SET MADE BY A. C. GILBERT CO.


HOPPER FEED ONE 6-32 SCREW, INSERT SCREW IN TAPPED HOLE
TAP ONE 6-32 HOLE
AUTOMATICALLY INSPECT AND EJECT
HOPPER FEED PIERCED AND FORMED BLANK... TRANSFER TO DIAL CAVITY

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Production on a No. 40-10 Bodine automatic multi-spindle machine, tooled for tapping and screw inserting, with hopper feed, is 50 pieces per minute...with but part time attention by operator.

Perhaps one of Bodine's six standard sizes can be tooled for your specific job. Milling, Drilling, Tapping and Screw Inserting may be included in one machine...for high speed, low cost production.

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Send for Catalog which gives all technical details. Ask Bodine engineers for practical recommendations.

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Increase Production Range
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NEW INDEX MILLING MACHINE

VERTICAL • HORIZONTAL • ANGLE MILLING

BORING • DRILLING

The new Index Angle-Milling Head accurately handles horizontal milling operations of every type. Change over from vertical to angle milling takes only a few seconds and is done without disturbing the work on the machine table. The attachment can also be used as a cutting arbor or tool holder.

- **Table Size - 8 x 34″.**
- **Automatic Spindle and Table Feed.**
- **Twelve variable cutter speeds up to 2450 rpm.**
- **Three table speeds can be varied indefinitely.**

The Model 50 Index Milling Machine offers a greatly increased range of working capacity over any machine of comparable size or cost, plus a substantial saving on production time and labor. The sound engineering and solid construction of the machine make an extremely rigid unit without deflection or chatter.

A quick change full-geared table feed mechanism delivers power to the table through a splined feed shaft. The Key Way of the Lead Screw is eliminated, increasing precision and sensitive operation. Hand finishing is reduced to a minimum.

Other features of the Index Milling Machine include precision ground Lead Screws, large, easy-to-read Angle Dials, Automatic Controls throughout and a full line of accessories.

Send Today for the NEW INDEX CATALOG

INDEX MACHINE CO.

540 N. MECHANIC STREET JACKSON, MICHIGAN

that accidents have no respect for the competency of workers. The most efficient employee is prone to accidents if insufficient safety precautions are taken.

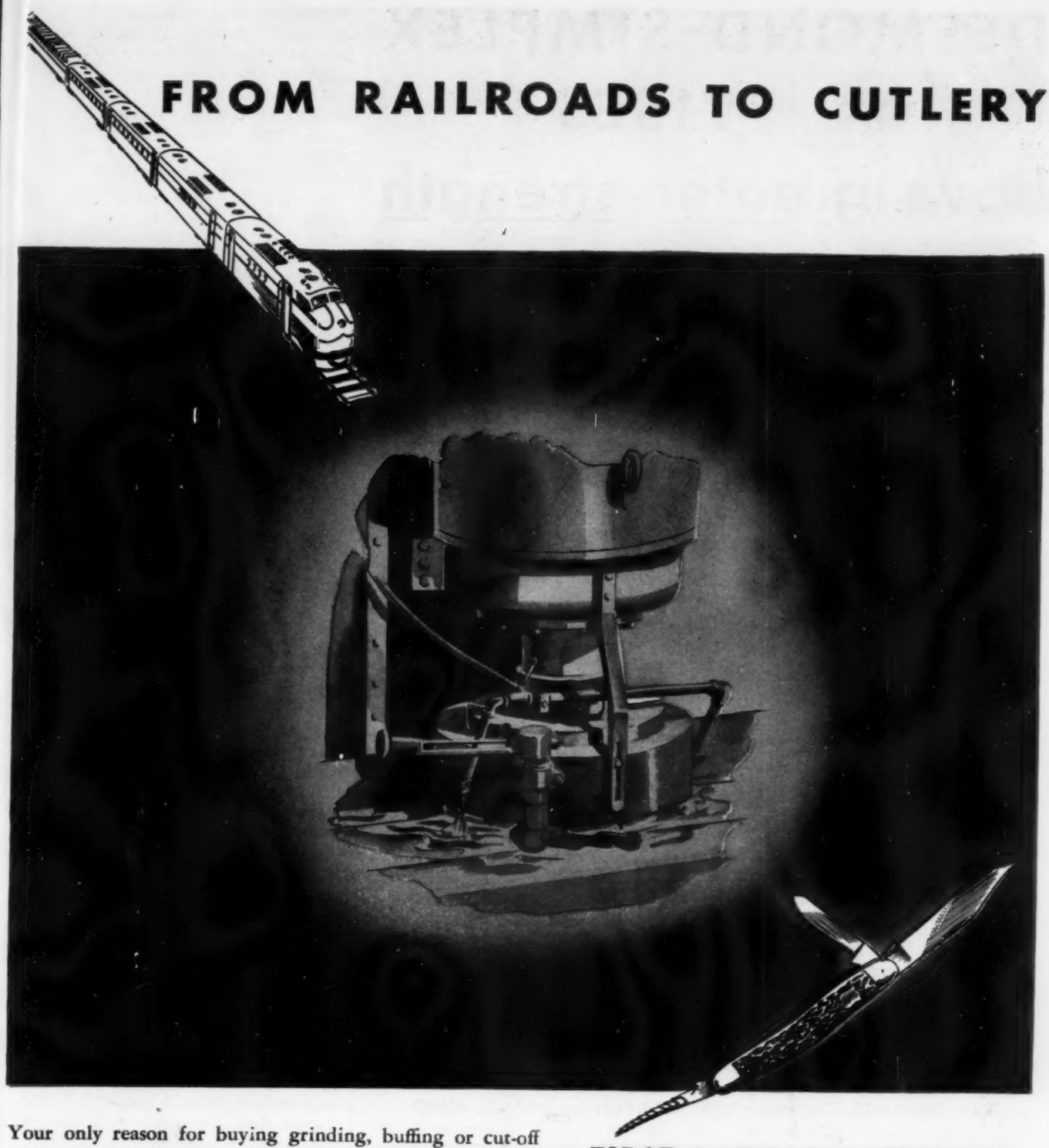
Safety today is an accepted part of industrial life, ranking in importance with cost control, quality control, production planning, and personnel. It is rare these days to find a plant that operates with disregard for safety. This represents a remarkable change since the turn of the century, when only a few farsighted firms recognized the need for conserving their manpower and resources through the prevention of accidents.

Accidents always represented waste, but their cost was not clearly realized until the passage of compensation legislation and the growth of proper compensation insurance coverage brought the direct cost of accidents together under one heading and made their presence unmistakable on a cost sheet. Humane consideration for the pain, misery, and hardship brought on by accidental injury gave first impetus to the safety movement, and thereafter it was found that the safe way was the efficient way.

It is now good business to practice safety. A plant operated safely will have laid a good groundwork for harmonious relations with its employees. Safety must take its place among the important elements in factory operations over which a foreman has control. The foreman is the keyman in safety because he is the actual point of contact between the worker and management. In his daily contacts in his department, he can observe in detail the work of his men as it pertains to safety, and recommend the changes necessary to assure safer operation. One of the foreman's duties is educating the workers in safety by pointing out the specific phases of their work which are unsafe and how these may be corrected. The importance of having a good safety record is worthy of consideration, because greater number of companies each day are placing considerable importance upon the safety records of the men whom they promote to higher ranks. If a foreman cannot operate his own dept. safely, it is difficult to believe that he could operate a group of depts., or an entire plant safely.

The importance of accident-cost reductions can be realized when it is noted that indirect accident costs take into account the costs arising through the lost time of the injured employee, time lost by other employees who stop work at the time of an accident, interference with

FROM RAILROADS TO CUTLERY



Your only reason for buying grinding, buffing or cut-off equipment is to make production more profitable. To help you do this, Bridgeport makes machines known all over the world for ruggedness and advanced engineering. Bridgeport engineering includes not only equipment engineers but abrasive specialists. Perhaps most important of all we "live" with every installation until the buyer is satisfied that he never made a sounder investment in production machinery.

Your inquiry regarding Bridgeport Grinders will have prompt, authoritative attention.

Just off the press . . . A new catalog on Bridgeport's New Model 400 Cutlery Grinder. Write for it today.

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Horizontal Face Grinders, Vertical Grinders, Cutlery Grinders, Buffing Lathes, Knife Grinders, Floor Grinders, Abrasive Cut-off Machines, Buxite Abrasive Wheels.

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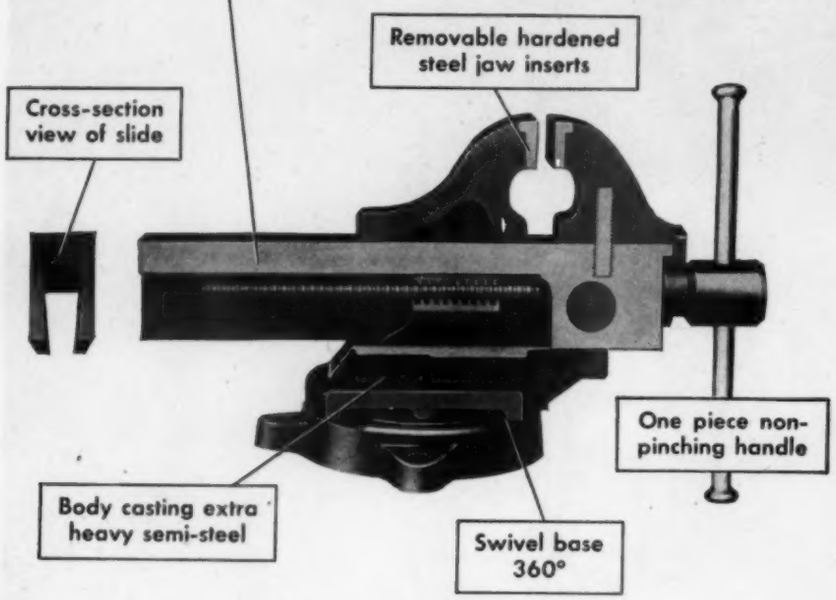
DESMOND-SIMPLEX VISES have greater strength



Above is given the "inside story" of the Solid Steel Slide on DESMOND-SIMPLEX Vises that makes them *much stronger* than ordinary iron slide vises.

Other major features are shown also, all of which are worthy of close study. But, above all, is Desmond's long experience in making vises for practically all requirements—machinists', combination pipe, welders', filers', drill press and milling machine, utility or garage, and woodworkers' vises.

All Desmond products—including grinding wheel dressers and cutters for all requirements—are available through leading industrial supply distributors. Write TODAY for complete catalog.

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Desmond

SIMPLEX STEEL SLIDE VISES

BALL BEARING DRESSERS | REVOLVING CUTTER TYPE DRESSERS | DIAMOND HAND TOOLS AND NIBS | WHEEL TYPE DRESSERS | SIMPLEX STEEL-SLIDE VISES

production, spoilage of material and decreased efficiency. It has recently been estimated that for every dollar spent on direct compensation, medical services, and insurance payments, $4 is lost through other causes. Thus, if the direct cost of one accident is $500, the total cost is probably $2500.

To reach this goal safety requires a close study of accidents and hazards. It is the accident itself that is most prominently associated with any injury or damage. The word "accident" for too long has been closely associated with the idea of a sudden and unexpected event. This is an unfortunate connection, because the great majority of all accidents can be foreseen and prevented.

This is a broad statement, but it has been proved in many instances. It is true because preceding every accident there is a hazard, a source of risk, either mechanical or personal. If the hazard is removed. then the accident is prevented, and that is what is meant by accident prevention.

Machinery and equipment should be carefully examined for unguarded gears, drives, and protecting parts which might cause injury to anyone coming in contact with them. Properly designed guards are the best method of preventing such contacts. Unfortunitely, machinery manufacturers do not always completely guard their equipment when it is shipped, and many plants today add a considerable number of guards to new machinery before it is put into operation. The absence of a guard on a new machine does not indicate that it should not be there. Any part of a machine which might, through contact with a person, cause injury should be thoroughly guarded. In most instances, it is possible to do this without interfering with the functions of a machine. Shears, punch presses, knives, and cutters may appear difficult to guard at first glance, but there are available a considerable number of guards for such purposes, which are either commercially manufactured or designed to fit particular machines.

The fallacious argument that too many guards affect the **proper** use of the machine lends credence to the assumption that the worker has not been made safety-conscious. Guards only cover the danger points of the machine and rarely slow down production. The workers should be made to understand the value of the guards as deterrents to accidents. Keeping safe on the job helps the worker keep production up.

Cuts Cost of Human Error to the Bone

Adds Productive Time to Machines with Faster, More Efficient Handling and Application of Lubricants

Your Lubrication Methods May Be More Antiquated Than You Suspect!

There you have it—the dilemma that faces many an oiler . . . maybe yours! The Alemite Representative is a specialist in simplified, modern methods of handling and applying lubricants. A five minute conference with him may be a revelation in new cost-cutting ideas. Write to Alemite, 1800 Diversey Parkway, Chicago 14, Illinois.

Most machines demand one or more different types of oils and greases at different intervals. That's where "human error" steps in to boost maintenance and repair costs. And that's where the Alemite Coloroute System steps in to control lubrication and prevent mistakes that cost you money and machine time.

With the Coloroute System, all lubricants and containers and lubrication equipment are color-marked to correspond with a color symbol at each lubrication point on the machine. The oiler can't miss a bearing, or use the wrong lubricant or lubricate at the wrong time. Thus, costly bearings don't fail because of faulty lubrication. It's just one of many ways Alemite Methods help to cut production costs!

The Alemite Representative can show you case after case where a time study analysis has proved that modern Alemite Methods eliminate costly, time-consuming handling of oils and greases. These same methods slash shutdown time for lubrication . . . completely mechanize lubrication from-barrel-to-bearing . . . add more productive time to machines. He can show you how to lubricate as many as 300 bearings from *one* central point while the machine keeps on producing! Get the facts!

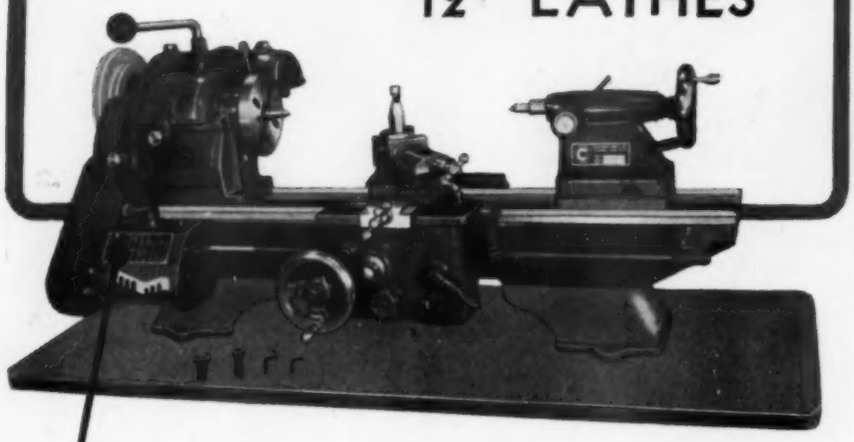
ALEMITE

Another Product of STEWART WARNER

MODERN LUBRICATION METHODS THAT CUT PRODUCTION COSTS

Clausing

DUAL QUICK CHANGE 12" LATHES



48 THREADS AND POWER FEEDS AT YOUR FINGERTIPS

Designed for wide range performance and utmost ease of operation. The Clausing Dual Quick Change 12" Lathe gives instant selection of 48 threads and feeds . . . simply by shifting two levers. Gives finer feeds instantly without stopping lathe. Saves set-up time and operating time on any turning operation requiring power feed. Easy-to-read chart shows lever and gear positions. The Synchronized Gear Box is of "big machine" design and construction. Liberal use of precision ball bearings on which shafts turn readily, with a minimum of friction. Gears are machine cut, ½" wide for greater strength and longer life. Compare the Clausing Quick Change with lathes in this price range.

ADDITIONAL Clausing FEATURES

Precision ground bed with two flat and two vee ways . . . Adjustable Timken tapered roller bearing headstock . . . Ball bearing friction clutch countershaft . . . Nine spindle speeds from 33 to 2400 r.p.m. . . . Hooded V-belt drive . . . Automatic apron . . .

For smooth, accurate performance, greater convenience and lasting satisfaction investigate Clausing Lathes today.

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Please send complete literature on Clausing Precision Lathes.

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It is true that the workers should know the machine, how it operates and its hazards, in order to prevent accidents, but that alone is not enough. "To err is human," and as long as the human element is present, the use of safety devices "is divine."

Harry Kaufman
Phila. 26, Pa.

•

DOES A RAISE RAISE OUTPUT?

It seems that with increases in wages, efficiencies of certain operations drop off.

Under present-day union control, workers are swayed by mass thinking; individually they react differently. They know that to shirk does not tend to increase production and does not help the company profits. Yet, under the control of the mass thinking of the union, they collectively seem to feel that the company and the nation as a whole owes them a living. Each person gets in return only the value of his or her output.

Still we haven't touched upon how we can raise the efficiency of today's workers. Maybe we need incentive plans for all labor—perhaps a plan that forces a worker to increase production in order to increase his wage. Yet this plan can fail without proper education of the employee as well as the employer.

Perhaps companies should all operate on a profit-sharing basis. Here the worker must be educated in the working methods of the company. Again education must be the means to make the system work.

A plan to keep all employees satisfied with working conditions by making certain company-sponsored programs fit into the welfare of the employee might help increase efficiency. Yet here again, unless each employee reaches a certain educational standard the plan fails. It would seem that education plays an all-important part in the success of increasing efficiency.

A few years before this highly organized unionism got under way, the worker was suppressed by big business. Large enterprises had won a battle after the first war and wiped out unionism. Why? Not because big business was right and the union wrong, but because big business had more highly trained men; men educated along special lines. The worker and his union had not learned how to combat business. They thought to be banded together was all that was necessary.

Business did not realize that to really win it had to step down to the employee level and educate the

SQUARE D *Electronic* WELDER CONTROL is designed to INDUSTRIAL STANDARDS

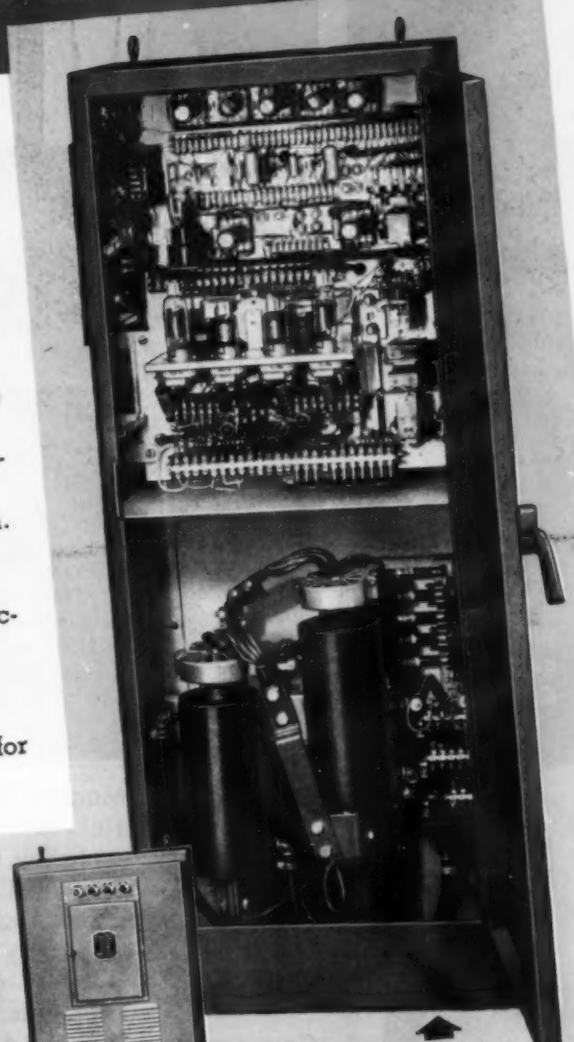
Class 8993 Combination Controllers for Spot Welders Provide Accurate Time and Current Measure Recommended for Welding Non-Ferrous Metals, Stainless Steels, Small Parts and Other Critical Industrial Jobs

ALL FOUR CONTROL ELEMENTS IN ONE ENCLOSURE

- Electronic contactor to carry welder transformer primary current.
- Heat control to adjust welding current from 20% to 100%.
- Synchronous-precision weld timer to control duration of current flow.
- Sequence timer for control of electrode motion.

IMPORTANT NEW CONSTRUCTION FEATURES

- All terminals and circuit tie points completely accessible.
- Each element an interchangeable subpanel.
- Side of machine or wall mounting.
- Screwdriver and pliers only tools required for maintenance.



All circuit terminals and tie points accessible by opening main door and swinging out sequence panel.

IMPORTANT NEW CIRCUIT FEATURES

- Separate excitation of ignitors makes firing independent of load voltage or current.
- Differential discharge timing eliminates voltage errors.
- All-electronic circuit—no sequencing relays.
- Safe—110 volt initiating, no-weld and pressure switch circuits.

Class 8993 controller can be arranged either for side of machine mounting or wall mounting.

Write for Bulletin **208**
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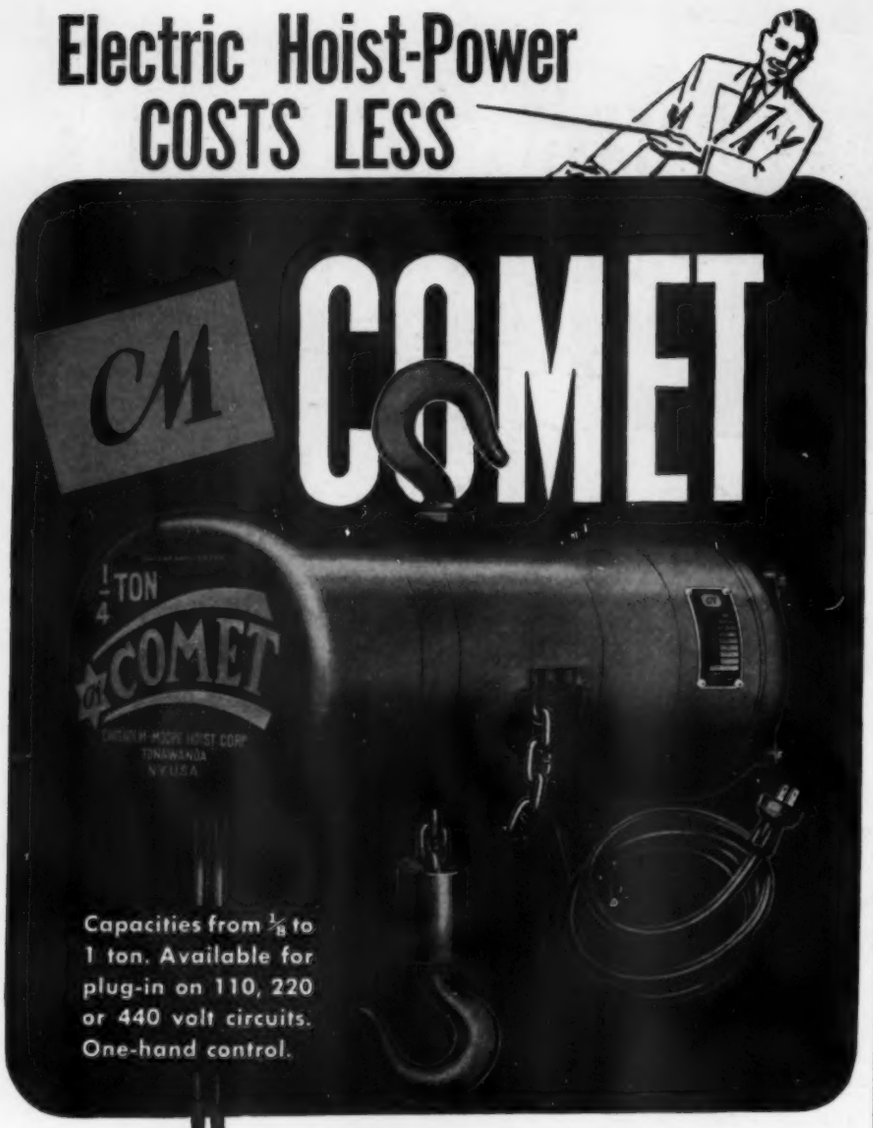
Electric Hoist-Power COSTS LESS



Capacities from 1/8 to 1 ton. Available for plug-in on 110, 220 or 440 volt circuits. One-hand control.

- ECONOMICAL
- PORTABLE
- SPEEDY
- STURDY

Manual handling of materials is inefficient . . . more so today than ever before. The CM Comet makes substantial savings in materials handling costs . . . is doing it every day in thousands of plants. Possibly the CM Comet can save a good many dollars for you too. Check up on the materials handling situation in your plant. CM Bulletin 138 . . . available for the asking . . . will bring you complete details about the Comet.

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HOIST CORPORATION
(Affiliated with Columbus McKinnon Chain Corporation)

GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.
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worker as to how a business is run. This is not easy and is not accomplished in a day, or even a year.

Big business in the 1920's didn't do this, so again union started to grow. The big bosses of the unions realized where they had failed before and started a one-sided educational program. They stressed the things that would strengthen the unions. They talked the employee's language. They used mass psychology and built up an organization that has just about held big and little business in its hand.

True, our laws helped them, but how did they get them? Better education and better lobbying—big business methods.

The problem today is to educate the worker to realize that he has only one side of the story. Businesses cannot be run without profits. Wages cannot be paid without production, to be converted into hard cash.

The men now at the heads of both unions and big manufacturing industries have felt and tasted power and are reluctant to relinquish it. They are selfish, thinking only of their own success. The worker is but a stepping stone, a pawn in the game of getting rich.

Only by getting both business and union to realize the great folly of this situation and to implement their willingness to work for a new and better industrial era, can this situation be corrected.

Charles D. Townsend
Centralia, Mo.

•

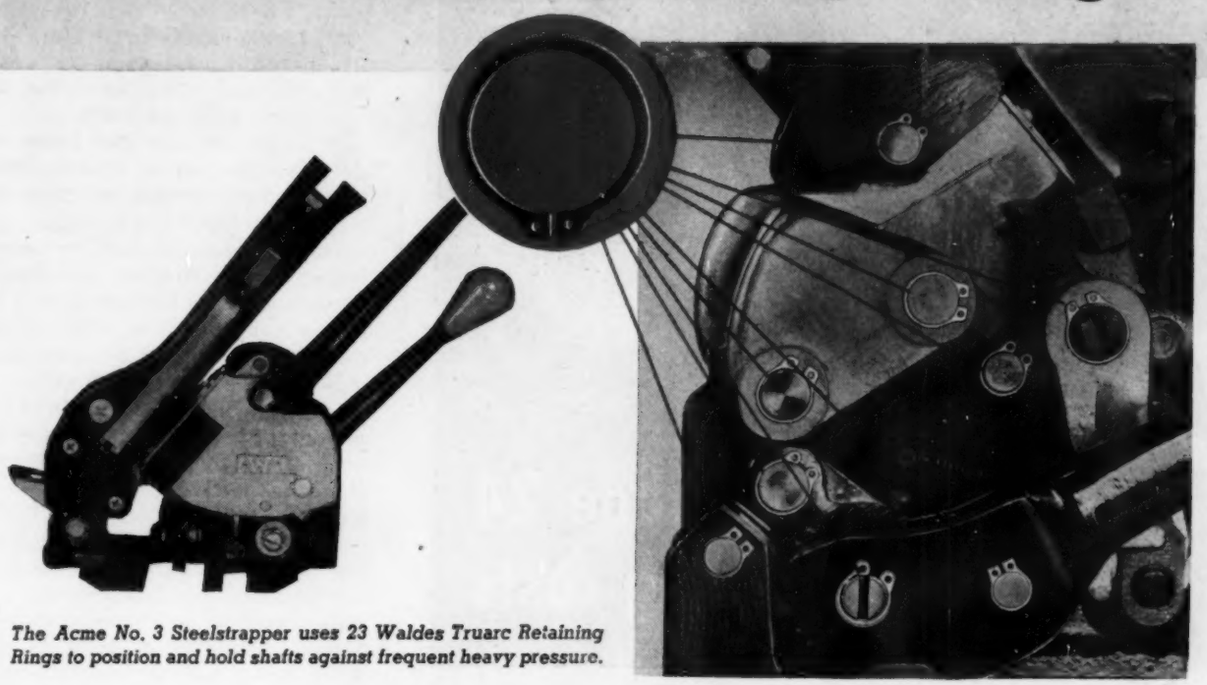
Due to technological advancement in the metalworking field, with little effort a man can easily triple his daily work.

Just as household appliances have made it possible for the ladies to play bridge or golf while "hubby" works, so is the machinist vastly more productive, and with far less work and effort, in every way. It has cost company millions, but it has paid dividends.

The present generation of machinists are less efficient than the old, mainly due to the lack of apprenticeship systems, plus the speed at which everything is required, and the fact that the machinist doesn't have to be the clever, all-around man that was necessary in the past. Modern equipment methods have superseded the old-type machinist, who could do almost anything—and did. That type of man is no longer needed in the production department. His field is in the tool-and-die room and maintenance departments only need operators.

Many years ago if you worked in

23 Truarc rings permit changeover to centerless grinding savings



The Acme No. 3 Steelstrapper uses 23 Waldes Truarc Retaining Rings to position and hold shafts against frequent heavy pressure.

"The use of Truarc Retaining Rings permits centerless grinding of pins instead of plunge-grinding. This eliminates the problem of taper and reduces the required tensional tolerances of these parts," reports Acme Steel Company of Chicago. "Furthermore, use of Truarc rings gives the Steelstrapper smoother lines by eliminating unsightly projections. This results in a more streamlined housing, a definite sales advantage."

Making repairs is much easier too, because Truarc simplifies assembly and disassembly. Truarc rings are precision engineered, may be used over and over again, remain always circular to give a never-failing grip. Wherever you use machined shoulders, nuts, bolts, snap rings, cotter pins—there's a Truarc ring that does a better job of holding parts together. Truarc cuts costs, adds sales advantages. Waldes Truarc engineers will be glad to show how Truarc can help you. Send us your problem.

WALDES

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RETAINING RINGS

WALDES KOHINOOR, INC., LONG ISLAND CITY 1, NEW YORK

WALDES TRUARC RETAINING RINGS ARE PROTECTED BY U. S. PATS. 2,302,948; 2,026,454; 2,416,852 AND OTHER PATS. PEND.

● *Send for new Truarc booklet, "New Development In Retaining Rings"*

Waldes Kohinoor, Inc., 47-10 Austel Place 12Y
Long Island City 1, N. Y.

Please send booklet, "New Development In Retaining Rings" to:

Name_____

Title_____

Company_____

Business Address_____

City_____ Zone_____ State_____

A new inter-metallic compound in Grade 24 Ampco Metal results in longer runs for drawing dies such as these — in most cases many times longer than steel dies — before re-dressing.
Die-hard
Ampco Metal Grade 24
cuts your drawing costs

Gives longer runs before re-dressing — no galling and loading on stainless steel

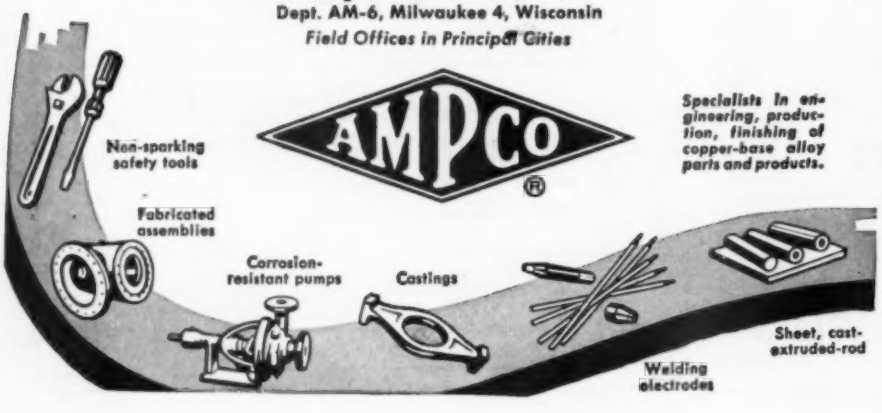
Here's the new Ampco Metal Alloy — Grade 24. It gives you more hardness and compressive strength than any other bronze — even more than Grade 22 Ampco Metal which you have used for your drawing and forming work in the past. Machinability of Grade 24 is about the same as that of Grade 22.

Dozens of disinterested shops have already tested this new alloy in die work. They *proved* that Grade 24 gives you 2 to 5 times the die life previously considered standard.

These tests also proved that Grade 24 Ampco Metal dies are superior to steel dies on many jobs, especially stainless steel. A typical test case showed a 77,000 run on an Ampco Metal die, compared to a 3000 run on a steel die. The Ampco Metal die does not seize or gall. There is less frequent need for re-dressing. As a result, you get longer runs at lower cost. Actual superiority varies according to die-tolerances and working stock.

Plan now to get more work per dollar from your dies. Use the longer-run advantages of Grade 24 Ampco Metal to avoid investment in more expensive carbide dies. See your nearby Ampco engineer today, for the complete cost-cutting story on Grade 24! Write for bulletins giving complete data today.

Ampco Metal, Inc.
Dept. AM-6, Milwaukee 4, Wisconsin
Field Offices in Principal Cities



a machine shop, your foreman was the man who had the say as to whether you rated a raise. If there were around 50 fellows in the shop, there would be almost as many different rates of pay. The foreman made sure that you earned every raise you got before you received it.

As unions became stronger, they practically forced the position to the point where they demanded, and got, blanket raises for all employees, whether they were worth an advance in pay or not. This has caused employers to limit the earnings of the best men to justify the union rate. Today, when union officials decide that a raise is in order, they don't claim it on the basis of higher production, increased skill, or competence; they claim their members are underpaid, and often claim that employer profits are so high that the men have a right to a higher wage.

It is doubtful if the majority of skilled machinists are any better off now at what appears to be very high wages than they were in 1939, since the cost of living has gone up in some cases 115%.

However, output of work per man has risen steadily because with the tremendous advances made, machine-wise, an employee cannot help turning out 4 or 5 times as much work today as was possible in the past.

However, in the past a worker knew he had earned the reward of a raise; today the satisfaction is clouded by the feeling that the raise is the result only of being a union member.

Arthur Silvester
Niantic, Conn.

•

I don't think a raise of the blanket boosts output to an appreciable extent, based as it usually is on an increase in the cost of living, but as it eases the economic burden of the wage earner until the next inevitable price boost comes along, it does have a beneficial effect on employee morale. For one thing, until the newness of the higher wage rate wears off, there will be a drop in absenteeism. Then again, the average employee likes to feel he is obtaining the prevailing rate for his industry.

However, I don't believe money is the ultimate solution to the problem of achieving maximum efficiency. The war should have taught us that high wage rates do not necessarily make a worker more productive. I believe the feeling of the average employee that he or she had a part in winning the war was the largest contributing factor in reaching the

Give Old Paint, Rust, Scale the BRUSH-OFF *FAST!*

Speed Up Sanding, Grinding, Planing, Too!

"A bear for work"..."one of the handiest tools in my shop"..."plenty of power for my toughest surfacing jobs"... that's how thousands of metalworking men rate their Black & Decker Sanders!

You can put these versatile Sanders to work . . .

(A) With B&D "Whirlwind" Wire Cup Brushes for removing old paint, rust, scale; cleaning castings, tanks, boilers, vats and sheet metal.

(B) With abrasive discs, for sanding any surface.

(C) With saucer grinding wheels for grinding any metal; smoothing welds and casting ridges; cutting off old rivets, studs and bolts.

(D) With rotary gouging and planing heads for shaping and semi-finishing lumber; removing stencil and brand marks from barrels and boxes.

These Sanders are full of quality features . . . as only Black & Decker knows how! Be sure to read the "inside story" shown below. Ask your nearby B & D Distributor for a demonstration. Write for free catalog to: The Black & Decker Mfg. Co., 616 Penna. Ave., Towson 4, Md.

LEADING DISTRIBUTORS EVERYWHERE SELL

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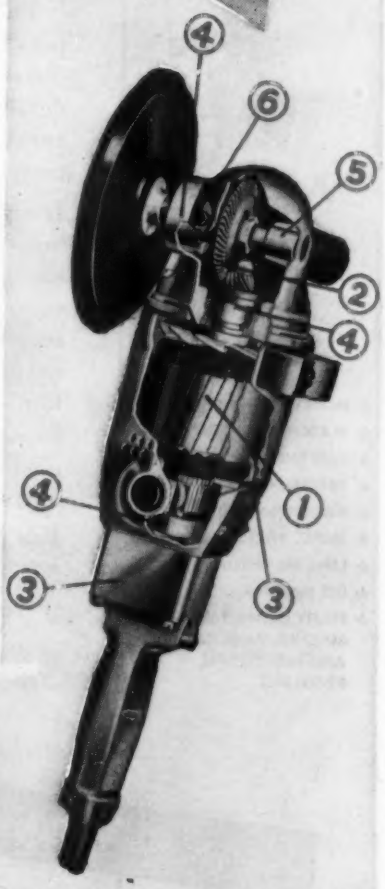
PORTABLE ELECTRIC TOOLS

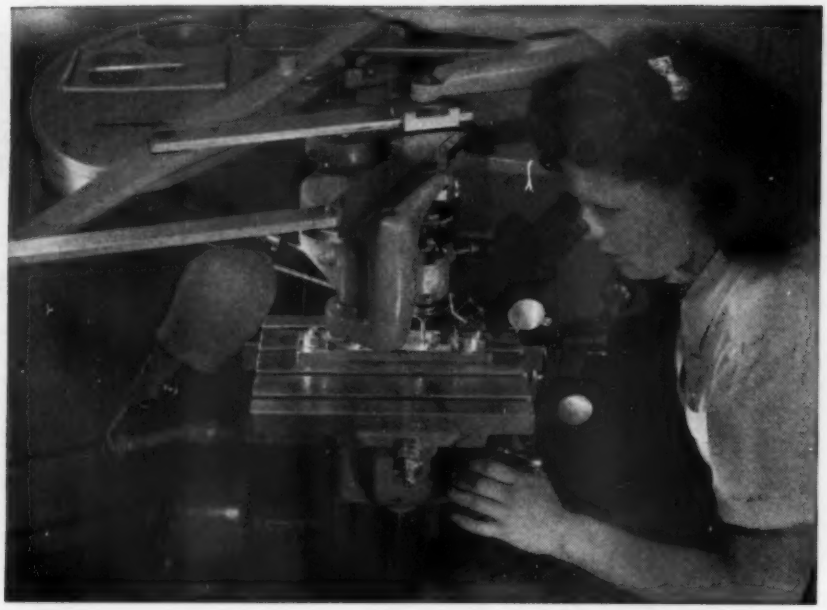
Drills • Sanders • Bench Grinders • Portable Grinders • Electric Saws
Screw Drivers • Nut Runners • Tappers



Here's the "INSIDE STORY" on Black & Decker Quality!

1. **Full-power Black & Decker universal motor.**
2. **Spiral beveled gears of heat-treated alloy, match-lapped spline-mounted for greater strength.**
3. **Commutator, bearings and switch sealed against abrasive dust or dirt.**
4. **All ball bearings on steel inserts and grease-sealed.**
5. **Needle roller bearing at back end of drive spindle.**
6. **Patented spindle lock for speed and ease in changing accessories.**

The SERVICE you get out of TOOLS depends on what's BUILT into them!



She SEES it better
she MAKES it better

This operator *knows* that her work will pass inspection. With the aid of a Spencer *Stereoscopic* Shop Microscope she sees smaller details and controls her operation more accurately. The result is less scrap; lowered costs; increased profits.

Designed to meet critical wartime requirements, the Spencer Shop Microscope offers manufacturers new possibilities for quality control at every point—inspection of raw materials, toolmaking, tool inspection during operation, fine machining, and final inspection. Equipped with or without standard base, it is adaptable and can be permanently mounted to your equipment. Choice of optics offers magnifications from 9X to 54X.

For further information write Dept. F157.

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- ★ WATCH ESCAPEMENTS
- ★ FINE ENGRAVING
- ★ PRECISION GRINDING
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- ★ SMALL PARTS INSPECTION
- ★ LENS MOUNTING
- ★ DIE SINKING
- ★ MANY OTHER TOOL-MAKING, FABRICATING, AND INSPECTION PROBLEMS

American Optical
COMPANY
Scientific Instrument Division
Buffalo 15, New York

Manufacturers of the SPENCER Scientific Instruments

production quotas that were essential. This feeling of teamwork can be achieved in peace as well as war.

How to achieve this? I believe there must be a sincere desire on the part of management to promote friendly relations with labor and a franker approach to their common problems. In the larger plant shop, committees can be formed to meet weekly to discuss shop problems and plan social events. In one plant I know of this worked out very well. As an offshoot of the weekly get-together, a credit union was formed with the plant treasurer as financial adviser. In this way employees were encouraged to discuss their financial and home affairs against a sympathetic and tactful background. The employee, aided by the counsel of the plant executive, went back to work with a mind considerably eased from home and financial worries and was more able to concentrate on production. The employer gained in increased productivity and a closer contact with employee problems. In this case, a sincere desire to help, translated into action, brought forth mutual benefit and—that most intangible of all intangibles—goodwill.

Robert S. Alexander
Greenville, R. I.

●

EASE IN OR BREAK IN?

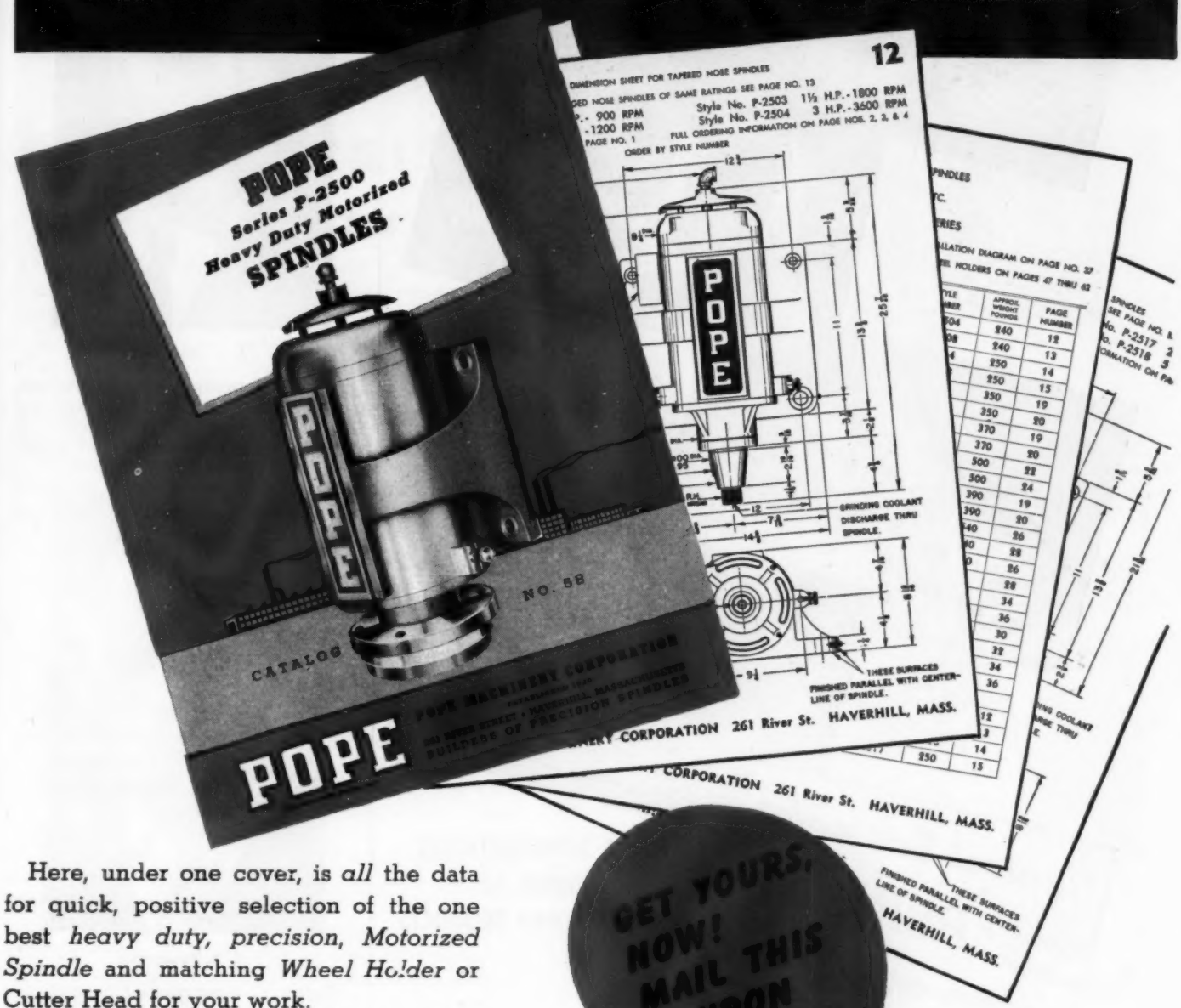
Al has the right idea on breaking in a new man. The foreman should take him in hand as soon as he reports and spend some time with him talking about his previous jobs, or perhaps some mutual acquaintances in other companies.

I then think he should be turned over to one of the regulars to be introduced to the men and shown around the shop. Let him observe the other fellows at work for a while to familiarize himself with how things are done. Given this chance to make himself feel at home, I assign him a minor job with the understanding that I am available at all times for any assistance or information he may desire.

It isn't fair to judge a man before he has had an opportunity to warm up. You can't expect that he is going to a new job and turn in peak performance right off the bat. He has to have time to acquaint himself with the new machines and get the feel of them. Once he knows what to expect of his equipment, he is better able to adjust his skill to it and get down to business on a regular scale. Only then can his ability be evaluated fairly.

Michael Axler
New York, N. Y.

You need this New POPE SPINDLE CATALOG if you do any grinding, boring or milling



Here, under one cover, is *all* the data for quick, positive selection of the one best *heavy duty, precision, Motorized Spindle* and matching *Wheel Holder* or Cutter Head for your work.

POPE Heavy Duty P-2500 Series Spindles with *Sealed-in Lubrication* are available from ¾ to 20 HP (special Spindles up to 75 HP), 900 to 3600 RPM.

It took months of engineering to develop this ready reference Catalog. It's all yours — to save your time and assure you fine finishes and fast removal of metal.

POPE MACHINERY CORPORATION

No. 51

GET YOURS, NOW! MAIL THIS COUPON

POPE MACHINERY CORPORATION
261 River Street, Haverhill, Massachusetts

Gentlemen:

Please mail me, without obligation or personal follow-up, a copy of your new CATALOG NO. 58.

Name_____ Position_____

Company_____

Address_____

Typical Examples of PERKINS **custom-cut GEARS**

FOR A REPRESENTATIVE NUMBER OF MANUFACTURED PRODUCTS

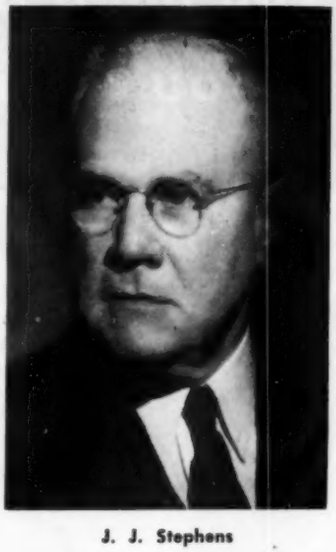
We have specialized in the mass production of precision gears to customers' specifications for nearly 30 years. Our equipment, facilities and experience enable us to fill orders for any type of gear in any quantity and material—metallic or non-metallic. Once your specifications are in our files, re-orders are filled automatically. Let us quote on your requirements now.

YOU FURNISH THE SPECIFICATIONS — WE'LL PRODUCE THE GEARS

PERKINS Precision, Custom-Cut GEARS

PERKINS MACHINE & GEAR CO., Springfield 2, Mass.

Names in the News



J. J. Stephens

J. J. Stephens, vice president, treasurer and general manager of Strong, Carlisle & Hammond Co. since 1940, has been elected president.

R. F. Koeneman

Ralph F. Koeneman has been appointed assistant chief engineer of the Passenger Car Engineering Div., American Car & Foundry Co.

Walter Geist has been reelected president for a seventh term of Allis-Chalmers Mfg. Co.

Lamotte T. Cohu has been named president of Consolidated Vultee Aircraft Corp., replacing **Harry Woodhead,** who has been recovering from a long illness.

J. L. Atwood has been named president of North American Aviation, Inc., succeeding **J. H. Kindelberger,** who has become chairman of the board.

John K. McNeeley has become special aviation project engineer of Jack & Heintz Precision Industries, Inc., Cleveland.

Fastening Operation Costs Cut 68%

with the ACME-MORRISON Metal Stitcher

A manufacturer of insecticide spray guns wanted to reduce his fastening production costs without sacrificing the quality of his product.

So he decided to try *metal stitches* (staples) instead of two screws for fastening the wooden plug to the end of the sprayer tube.

Using an Acme-Morrison Metal Stitcher, the manufacturer reports his material costs have dropped from $1.86 per thousand sprayers (for the screws) to an estimated 15 cents per thousand assemblies (for the stitching wire). This is a saving of over 91 per cent in material alone.

He has also reduced his labor costs about 38 per cent. With the screws, his labor charges were $1.50 per thousand sprayers. Now the Acme-Morrison Metal Stitcher has reduced this expense to 92 cents per thousand.

The combined savings on materials and labor is 68 per cent.

Acme-Morrison Metal Stitchers fasten metal to metal, or non-metallic materials to metal.

The secret is a wire stitch which works like your office stapler. In a single operation this machine forms its own stitch (or staple) from a coil of wire, drives it and clinches it. *No pre-punching is required.* These Acme-Morrison metal stitches replace rivets, screws, nails, bolts, and spot welding.

Get substantial savings like these by using the Acme-Morrison Metal Stitcher in your own assembly line. For further details about these time-saving, money-saving Metal Stitchers, mail the coupon today.

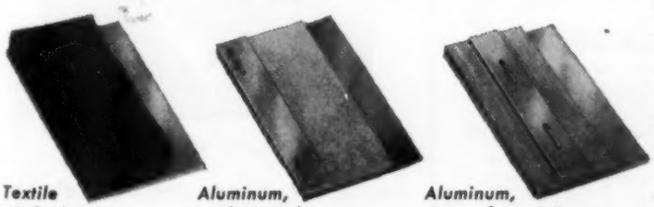
STITCHING WIRE DIVISION

ACME STEEL COMPANY

NEW YORK 17 ATLANTA CHICAGO 8 LOS ANGELES 11

Cross-section view of metal-to-metal stitch

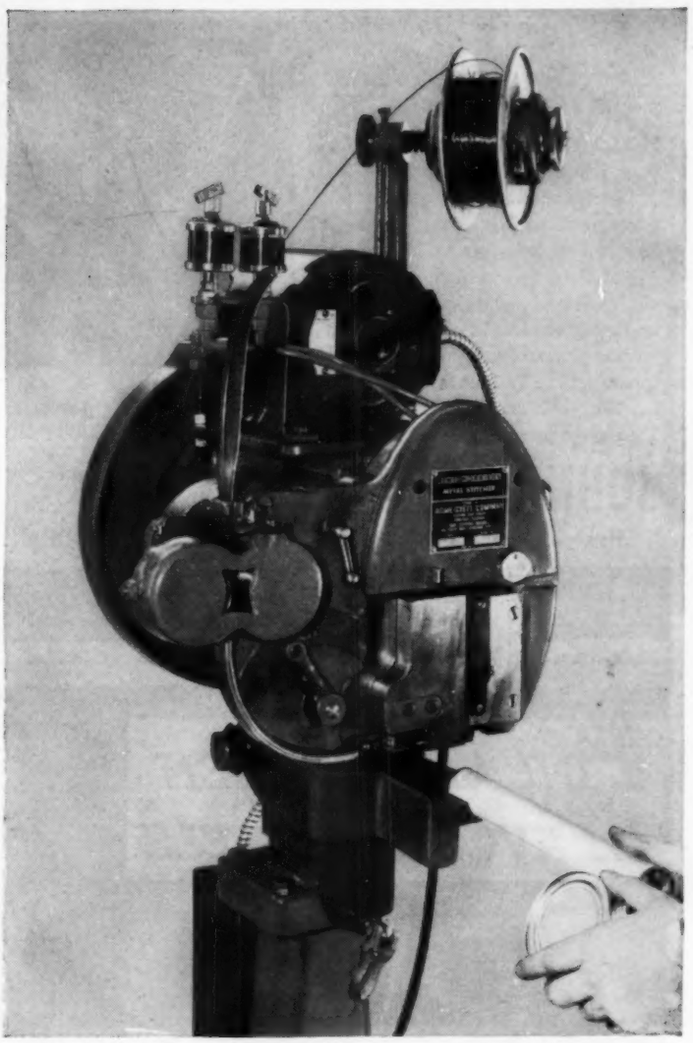
A few of many combinations



Textile stitched to aluminum

Aluminum, leather and copper stitched together

Aluminum, plywood and brass stitched together



A simple machined cradle, attached to the arm of the Metal Stitcher: gives support to the spray gun and allows the operator to "feel" the correct position for the stitch

ACME STEEL COMPANY, Dept. AM-68
2840 Archer Avenue
Chicago 8, Illinois

Gentlemen:

Please send me further details about the Metal Stitcher.

Name_____

Company_____

Address_____

City_____ Zone_____ State_____

special nails • rivets • screws • made to your order

HASSALL cold-heading may solve your immediate special part problem . . . Special nails, rivets and threaded parts made in diameters from 1/32" to 3/8"—lengths up to 7" . . . Rivets 3/32" diameter and smaller a specialty . . . Variety of metals, finishes and secondary operations . . . Economy, quality and quick delivery in large or small quantities . . . Tell us what you need . . . We will answer promptly. ASK FOR FREE CATALOG. 3-color Decimal Equivalents Wall Chart free on request.

JOHN HASSALL, INC. 174 Clay Street Brooklyn 22, N.Y.

Manufacturers of Cold-Headed Specialties—Established 1850

SPECIAL NAILS RIVETS SCREWS Hassall ESTABLISHED 1850

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HOYLAND STEEL

Forming die . . . made from "HSC 265" air hardening alloy steel. Preferred for its wear resistance (die illustrated ran up to ¼ million pieces before dressing) . . . its resistance to warping and distortion in heat treating.

An unusual assortment of fine tool steels . . . in various sizes, shapes, finishes, conditions . . . available promptly from the conveniently located warehouses of Hoyland Steel Company. Complete technical assistance in solving tool steel problems. Hoyland Steel Catalog-Work Book available on request.

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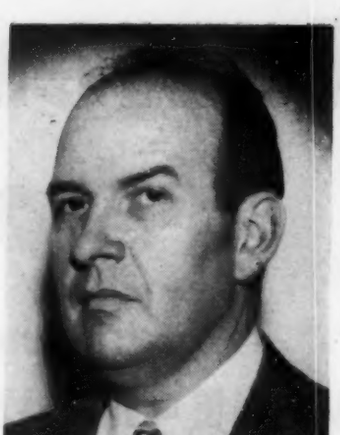
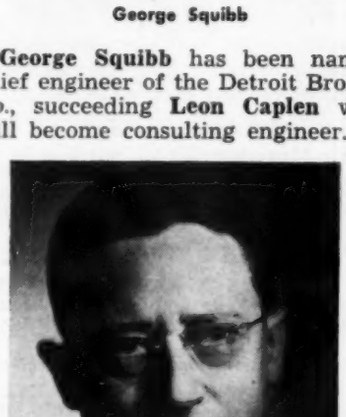


William H. Taylor

William H. Taylor has been appointed director of engineering for Tinnerman Products, Inc., Cleveland, and **George J. Schad,** treasurer and director.

George Squibb

George Squibb has been named chief engineer of the Detroit Broach Co., succeeding **Leon Caplen** who will become consulting engineer.



Eugene W. Fuller

Eugene W. Fuller has been elected vice president of Shakeproof, Inc., Chicago.

ACTUAL PERFORMANCE TEST PROVES THERE IS NO SUBSTITUTE FOR V-R CARBIDES

DETAILED REPORT:

MACHINE:	14½" South Bend Lathe.
OPERATION:	Boring Fusion Cup for Calorimeter; Bore face, bottom and outside rim.
MATERIAL:	99% Nickel.
TOOLS:	¾" Diameter by 8" Long V-R Carbide Tipped Boring Tool.

COMPARATIVE PERFORMANCE.

	V-R Carbide Grade EH	Other Carbides
S. F. M.:	225	140
F. R. REV.:	.002	.002
DEPTH OF CUT:	.020	.020
PCS. PER GRIND:	20	2 to 6
REMARKS:	V-R Carbide Tipped Tools eliminated off-tolerance rejections and produced outstanding increases in pieces per grind. Quality of finish resulted in reducing polishing time from 40 minutes to 15 minutes.	

In this and in thousands of other actual machining operations V-R Carbide tools have proven their superiority in eliminating off-tolerance rejections and producing outstanding increases in pieces per grind.

Vascoloy-Ramet carbide tools and blanks are offered in an almost unlimited choice of styles, grades and dimensions to meet any industrial requirement.

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CALL your nearest V-R Branch Office today for an effective and economical solution to your production problems.

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PRECISION FEATURES . . . ACCURATE SHEARING

Wysong and Miles No. 1296, 8 Foot - 12 Gauge

with *Wysong and Miles* POWER SQUARING SHEARS

Cut shearing overhead on metals up to 10 gauge with *Wysong and Miles* Power Squaring Shears. Balanced semi-steel construction insures accurate alignment. Precision features cut down shearing time and give accurate work.

COMPENSATING HOLDDOWN
Individual spring activated plunger in each foot firmly clamps full sheets or small strips that come only under one plunger.

PRECISION BACK GAUGE
Ball-bearing, parallel back gauge is quickly adjusted to .0078 (1/128th) of an inch by a handwheel dial reading.

MULTIPLE DISK CLUTCH
Treadle activated friction clutch gives quick pick-up with a minimum jar. Clutch has a non-repeat safety feature.

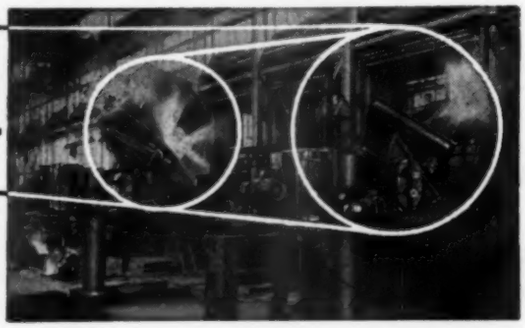
Other fine Wysong and Miles Squaring Shears in 10, 12 and 14 gauge. Write for complete information.

WYSONG and MILES Co

623 Fulton Street Greensboro, N. C.

the FINEST in SQUARING SHEARS and BENDING ROLLS

More WELDING going on here.....



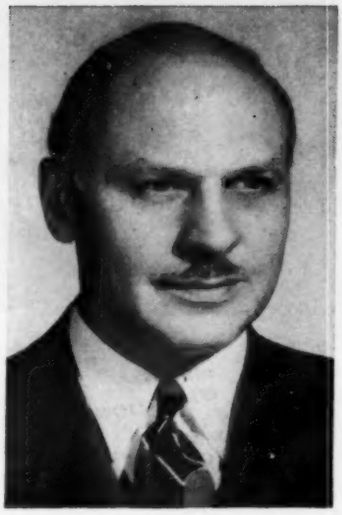
More welding and less time spent in flopping, propping up and crawling around weldments is the end result of the C-F Positioners in this welding department.

Mounted on C-F Welding Positioners, weldments can be quickly brought into position for a down-hand pass—better, more uniform welds with resulting economies and production increases follow. Welders spend more time welding when they work with C-F Positioners because one "set-up" on the table allows them to maneuver the job without assistance, whether hand or power operated Positioners are used.

Power operated, variable speed C-F speeds in any range from 0 RPM and up, coupled with table tilt to 135° from the horizontal make them the logical choice for any production welding operation. Like all C-F Positioners they have drilled tables for easy set-ups or tables can be quickly removed for installation of special fixtures or jigs. Write for Bulletin WP 22, CULLEN-FRIESTEDT CO., 1313 S. Kilbourn Ave., Chicago 23, Ill.

C-F positioned welds mean better, more

CULLEN-FRIESTEDT CO., CHICAGO 23, ILL.



Russell J. Nadherny

Russell J. Nadherny has been named executive vice president and director of engineering and production of Barnes & Reinecke, Inc., Chicago.

Luke E. Sawyer has been elected executive vice president and director of the Babcock & Wilcox Tube Co.

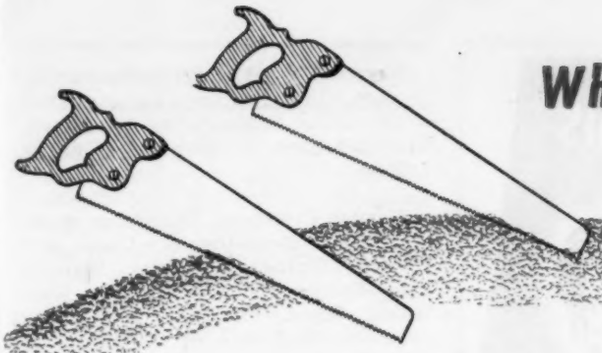
Graham J. Logan has been appointed assistant superintendent of McConway & Torley Corp., Pittsburgh.

BUSINESS ITEMS

F. J. Sikorovsky

Greenfield Tap & Die Corp., Greenfield, Mass., has purchased **Ampco Twist Drill Corp.,** Jackson, Mich. Frank J. Sikorovsky will continue as president of Ampco and has been named a director of Greenfield.

Lear, Inc., Grand Rapids, Mich., has acquired **Romec Pump Co.,** Elyria, Ohio.



Which Saw will cut longer?

All saws look pretty much alike. But they don't cut alike. There's a big difference in cutting ability that can be discovered only by actual use.

Which CARBIDE will cut longer?

You may think "carbide is carbide" because they all look alike. Unfortunately, you can't SEE the difference in carbides—*it can be demonstrated only on your machines!*

Job records prove

3 to 10 times more pieces

with improved TECO *Cemented Carbide*

Improved TECO Cemented Carbide has remarkable resistance to wear and breakage in turning, boring and facing. Scores of plants report drastic production increases per tool.

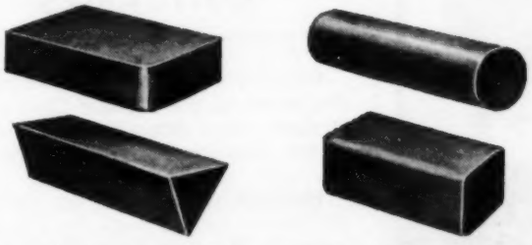
PROVE IT YOURSELF. Tool up a machine on any carbide job, with Improved TECO. Run as usual. Check pieces per grind, grinds per tool, tool life, tool cost. Then run at higher speeds and feeds and note its unusual performance. When ordering, send details of machining set-up. Catalog and price list on request.

OPPORTUNITY FOR TOOL MANUFACTURERS to cash in on fast-growing demand for TECO Cemented Carbide. Write us for full details.

●

MILL SUPPLY HOUSES—Territories open for line of standard TECO Cemented Carbide Tools. Write us.

TUNGSTEN ELECTRIC CORP. 568 39th Street, Union City, N. J.—Representatives: Indianapolis • Cleveland • Detroit



IMPROVED TECO CEMENTED CARBIDE

Manufacturers of Tungsten Carbide—from ore to finished material—for over a quarter century

Leading builders of machine tools will tell you*...

HOFFMAN FILTRATION EQUIPMENT

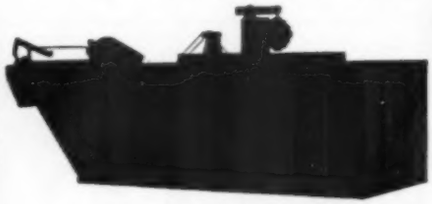
HELPS PRECISION WORK

LENGTHENS TOOL LIFE

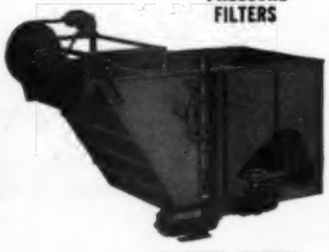
PAYS ITS WAY IN MAINTENANCE SAVINGS

Take a tip from the makers of America's finest machine tools. They recommend Hoffman filtration equipment as a standard accessory for better production. Hoffman units are engineered to deliver clean coolant at specified flow rates. They help to enhance precision finish . . . permit machines to operate longer without cleaning or replacement of cutting or grinding surfaces. Volume and quality of production are profitably improved. Write for Bulletin A-693 and a *free* engineering survey.

PRESSURE FILTERS



FLOTATION EQUIPMENT



VACUUM FILTERS

U. S. HOFFMAN MACHINERY CORPORATION
211 Lawson St., Syracuse, N. Y.
COOLANT FILTERS • FILTRATION ENGINEERING SERVICE

Dayton United Metal Spinners Co., Dayton, Ohio, has been incorporated with Louis Sakosky as president. The concern is seeking spinning lathes.

Vernon Critchley, 73, former president of the Reed-Prentice Corp., and of the Walden-Worcester Wrench Co., Worcester, Mass., died in Wellesley, Mass., on June 1. He was formerly chairman of the board of the Graton & Knight Mfg. Co., of the Arter Grinder Co., and Coppus Engineering Co., Worcester.

Matthews & Bartels, Inc., Dayton, has a $50,000 expansion program underway, which includes a new building.

Borg-Warner Corp., Chicago, has leased a plant from **Mueller Co.,** Decatur, Ill.

Cosa Corp., representatives in the U.S. for Swiss manufacturers, will represent many of these concerns in Canada. High precision machine tools and measuring instruments are included in these products.

Superweld Corp. has been organized in Los Angeles. Metal products, all types of metal joining and annealing will be done. Walter T. Weils is president, Robert E. Jones, vice president; C. B. Lansdown secretary-treasurer.

Cincinnati Time Recorder Co. has acquired the assets of the 100-year-old **Skinner Engine Co.,** Erie, Pa.

The Hydraulics Division, Airex Mfg. Co., Long Island City, N. Y., has been acquired by **Manning, Maxwell & Moore, Inc.**

Federal Tool & Mfg. Co., Minneapolis, Minn., has moved into a new plant.

General Controls has opened a new factory branch office in Denver, Colo.

Pyro Plastics Corp. has moved its factory and general offices to 690 Chestnut Street, Union, N. J.

OBITUARIES

Edward H. Luders, 81, secretary-treasurer of the Kelker Blower Co., Buffalo, died May 21. He was one of the founders of the concern.

Herman H. Church, 48, plant superintendent of Prosperity Co., Syracuse, N. Y., died May 21.

NEW BOOKS

WHAT ELECTRONICS DOES—*By Van Zeluff and John Markus, Associate Editors,* Electronics *Published by the McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y. 301 pages.*

This book, describing over 400 examples of electronic applications for doing useful work in a more economical manner or for performing hitherto impossible operations, impresses one with the magnitude of the field being served by electronics.

It is written in an easy, non-technical style, presenting the problem and its solution with similar cases arranged in groups that are related under general chapter headings, and should serve as a stimulus to thinking about new ways of doing old jobs.

Examples of special interest to metalworking men include hardening, brazing, tin-plating, painting, sorting, weighing, measuring, detecting flaws in material, gaging thickness, motor control of machine tools, and safety applications.

•

FILING SYSTEMS FOR ENGINEERING OFFICES—*Engineering Societies Library, 29 West 39th St., New York 18, N. Y. Price $2.*—Systems for filing of notes, correspondence, reprints, drawings, etc., are included in a list of 41 references to books and articles. General as well as specific information is given. An annotation summarizes the salient features of each article.

•

INDUCTION HEATING IN RELATION TO INDUSTRIAL GAS HEATING—*Published by American Gas Association, 420 Lexington Ave., New York 17, N. Y. 48 pages. Price $1.*

Prepared by Battelle Memorial Institute, this impartial survey reports the findings of its researchers as to the relative merits and applicability, of industrial gas heating and induction heating of metals, with the exception of melting.

The report is divided into four sections, the first dealing with indirect gas heating, the second direct gas heating, the third with induction heating, and the fourth with a metallurgical and economic appraisal of gas and induction heating. Several outstandingly successful applications of each type are described in detail. A final page suggests possible fields of research.

Hollow or Solid . . .

How do you want them?

Do you need cold drawn mechanical tubing or cold finished steel bars? We have both—and many other steel products, all in stock for quick shipment.

True—great demand sometimes depletes the supply of a kind or size here and there. Still, we probably have the largest over-all steel stocks in the country, and our cold finished bar and cold drawn tubing stocks are particularly good. Round bars range in size from 1/16" to 10" with analyses suitable for every application. Ryerson mechanical tubing stocks include sizes from ⅛" to 10½" O.D. in many wall thickness.

You can be confident of high quality steel when you draw on Ryerson stocks. For example, we carefully check cold finished bars for roundness, tubing for concentricity and both products for straightness, finish and size accuracy.

So whether you want them solid or hollow—whether you need bars or tubing—or other carbon, alloy and stainless steel products, call Ryerson. We are ready and anxious to work with you.

Joseph T. Ryerson & Son, Inc. Plants: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles, San Francisco.

PARTIAL LIST OF PRODUCTS: BARS—carbon & alloy, hot rolled & cold finished
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STRUCTURALS—I beams, H beams channels, angles, etc. PLATES—incl. safety floor plate
SHEETS—hot & cold rolled STAINLESS—Allegheny Metal sheets, plates, bars, etc.

RYERSON STEEL

CROSS UNIVERSAL GEAR MACHINES

for

- ROUNDING
- CHAMFERING
- POINTING
- BURRING

Cross Universal Gear Machines embody advanced engineering developments to obtain highest productivity and assure lowest possible operating costs.

They feature utmost flexibility for handling a wide variety of gears. Continuous cutting motion, exclusive with Cross, speeds production at top efficiency.

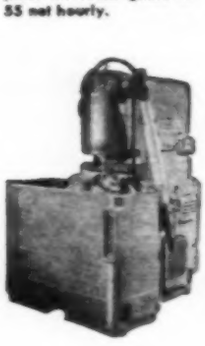
Special skill is not required because machines are automatic and push button controlled. Power clamping is foot pedal controlled. Both hands are free for work handling.

No. 55

For rounding, pointing, chamfering or burring external and internal:

spur gears
helical gears
clutches
splines

Typical productivity when rounding or pointing 8 pitch 30 tooth gears is 55 net hourly.



No. 65

For pointing or chamfering external and internal:

clutches
spur gears
bevel gears
splines

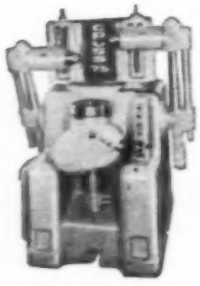
Typical productivity when pointing 10 pitch 30 tooth gears is 100 net hourly.

No. 75

For burring or chamfering both ends at the same time.

helical gears
spiral bevel pinions
hypoid pinions

Typical productivity when chamfering 8 pitch 40 tooth gears is 200 net hourly.



THE CROSS COMPANY
Established 1898
SPECIAL MACHINE TOOLS
MILLING • DRILLING • TAPPING • BORING
TURNING • SHAPING • GRINDING • HONING
DETROIT 7, MICHIGAN

DESIGN OF METAL CUTTING TOOLS—*By Frederic L. Woodcock, Chief Tool Designer, Hamilton Standard Propellers Division, United Aircraft Corp. Published by the McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y. 405 pages, 6 x 9 in. Price $5.*

In the preparation of this book, a painstaking and thoroughly competent job has been done. The principal types of cutting tools are analyzed, and careful instructions are given as to their design. The feature is that the author does not content himself with merely stating the recommended cutting angles, for example, but explains why they are needed and how they are determined. The designer is thus freed from the bonds of standard practice and enabled to tailor each particular tool to suit the job in hand.

The book is intended for the practical tool designer, production engineer and shop supervisor, but will be found equally suitable as a text for students and teachers of metal-cutting technology. Information is presented on the economics of tool design, selection of tool steels, heat treatment, and the use of coolants. Each major type of tool is then considered; its principle of operation explained, and details given of the how and why of its design. Precautionary notes are added regarding design details to facilitate conservation and salvage.

Profusely illustrated, it merits a place on every tool designer's desk and in every reference library.

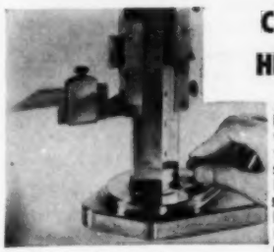
•

PRINCIPLES OF PERSONNEL TESTING—*By C. H. Lawshe, Jr., professor of psychology, Purdue University. Published by the McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y. 227 pages, 6x9 in. Price $.50.*

Planned primarily for management building a policy framework for personnel testing, and for test administrators themselves, this book is essentially practice rather than theory. It is a summary of procedure, covering the basis for personnel testing, test selection, measures of job success, analysis and presentation of results.

Test types covered include: mental ability, temperament and personality, interest and preference, visual skill, specific crafts and skills, etc. It is a useful, readily understandable and thorough treatment of a subject steadily increasing in importance.

SCHERR *aids to precision – production*



CHESTERMAN HEIGHT GAGE

A big, sturdy stabilized instrument which can double the output of your skilled toolmakers. Fine adjustment by screw operated from knurled nut on base (see photo) eliminates all chance of rocking or shifting instrument while measuring. Finger pressure on two lugs frees split nut for rapid up or down adjustment of the head. 2½" long vernier in place of the normal ⅝" vernier provides greater visibility without the need of magnifier or removing gage from work. Both English and metric readings one on each face of column. Made in sizes from 12" to 48"—capacities sufficient for the most unusual measurements.

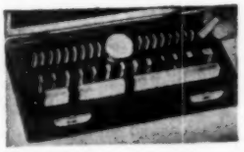
OPTI-FLAT GLASS SURFACE PLATE

Here is the basis for vertical measuring accuracy—an optically ground glass surface, flat within 50 millionths over the total area. A solid, non-warping, thick disc of Pyrex brand glass, set in a heavy wood base with dust-proof cover. Immune to the internal strains which may affect the accuracy of metal surface plates, with the added advantage that accidental scratches cannot cause raised burrs nor long usage wear the hard surface. For real accuracy in layout work and critical inspection, start from the perfect surface of a Scherr Opti-Flat. Two sizes—12" diam., 2" thick, $58 and 16" diam., 3" thick, $88. Also a complete stock of hand-scraped metal surface plates, angle irons, measuring irons, etc.

GAGE BLOCK UTILITY SET

Quick adjustable type holders. Greatly expands the usefulness of any set of standard gage blocks. The complete set includes four holders—2", 4", 8" and 12", two jaws each for inside and outside measurements, a 60 deg. center point, a scriber point, and a substantial height gage base. Holders have no long projecting screws to make handling awkward. Every shop can profitably use one or more of these economically-priced sets, which will save their cost many times over by applying gage block accuracy at first hand, allowing for no variation through the use of any other tool. Any parts of this set can be furnished separately at moderate cost. Set, $98.50.

ULTRA-CHEX GAGE-BLOCKS



The last word in modern basic accuracy brought within the grasp of all shops large and small. Sets in size for all budgets. All blocks accurate to five millionths. Illustrated is the 34-block set, giving 80,000 combinations in steps of 1/10,000", with optical flat for checking wear. Low prices allow for constant practical shop use in setting tools, checking gages, locating holes in jigs and fixtures, etc. Many shops use a number of sets, with one master set for reference. Set shown, $125.

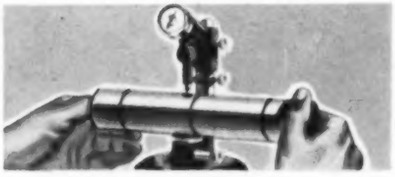
Write for full details on these tools, and for the Scherr Small Tool Catalog.

GEO. SCHERR CO., Inc.

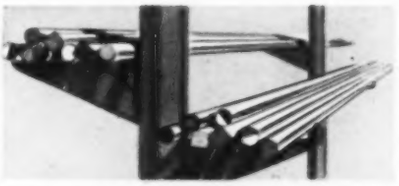
AXELSON FIRST CHOICE

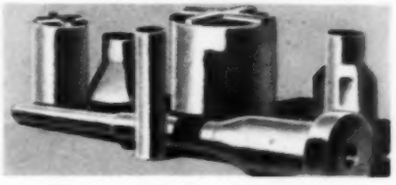
SHOP SUPERINTENDENTS AGREE that machinists produce more work of higher quality with fewer rejects on AXELSON engine lathes, because of their infinite ease of operation, greater versatility, and in-built precision. Control of manufacture... from foundry to assembly... makes this possible.

MORE PRODUCTION PER MAN-HOUR results when a job goes on an AXELSON lathe... machinists actually like to operate them... location of controls minimizes lost motion... extreme rigidity permits faster speeds... ample smooth power for the deepest cut without slowdown.

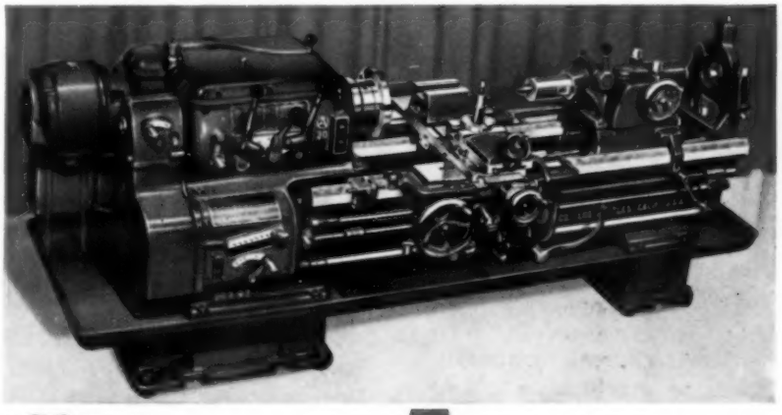


GREATER ACCURACY MEANS FEWER REJECTS... Massive bed designed to maintain absolute alignment... spring tension scrapers and felt wipers on carriage prevent dirt and chips from galling the ways... operator has complete, precision control of the cutting at all times.





ADAPTABLE TO ANY STOCK, JOB OR TOOL... Wide range of speeds and feeds... two-speed tailstock is standard equipment... with ram type turret, power rapid traverse, micrometer carriage stops, relieving and taper attachments, and many other accessories available for handling any work... designed to use all modern tooling.



MINIMUM MAINTENANCE AND REPAIR... Easier to tool-up and retain precision settings... forced-feed lubrication to carriage and cross slide ways, eliminates wear — gibbed slides permit easy compensating adjustments... all parts designed for longest life with the least maintenance.

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

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TAKE THE FIRST STEP toward comfort, efficiency and economy by choosing Reeves Army Twill for your industrial uniforms. In addition, garments of this high-quality fabric have the "New Functional Look" thus boosting employee morale and winning public good will.

The high tensile strength of Reeves Army Twill assures rugged wearability with long-lasting economy. Its wide range of vat-dyed colors are fast to sun, water and perspiration. It retains smart tailoring after repeated washings. Remember—over 90 million yards of this same fabric helped equip America's fighting men—exceeded Government specifications under the toughest climatic conditions.

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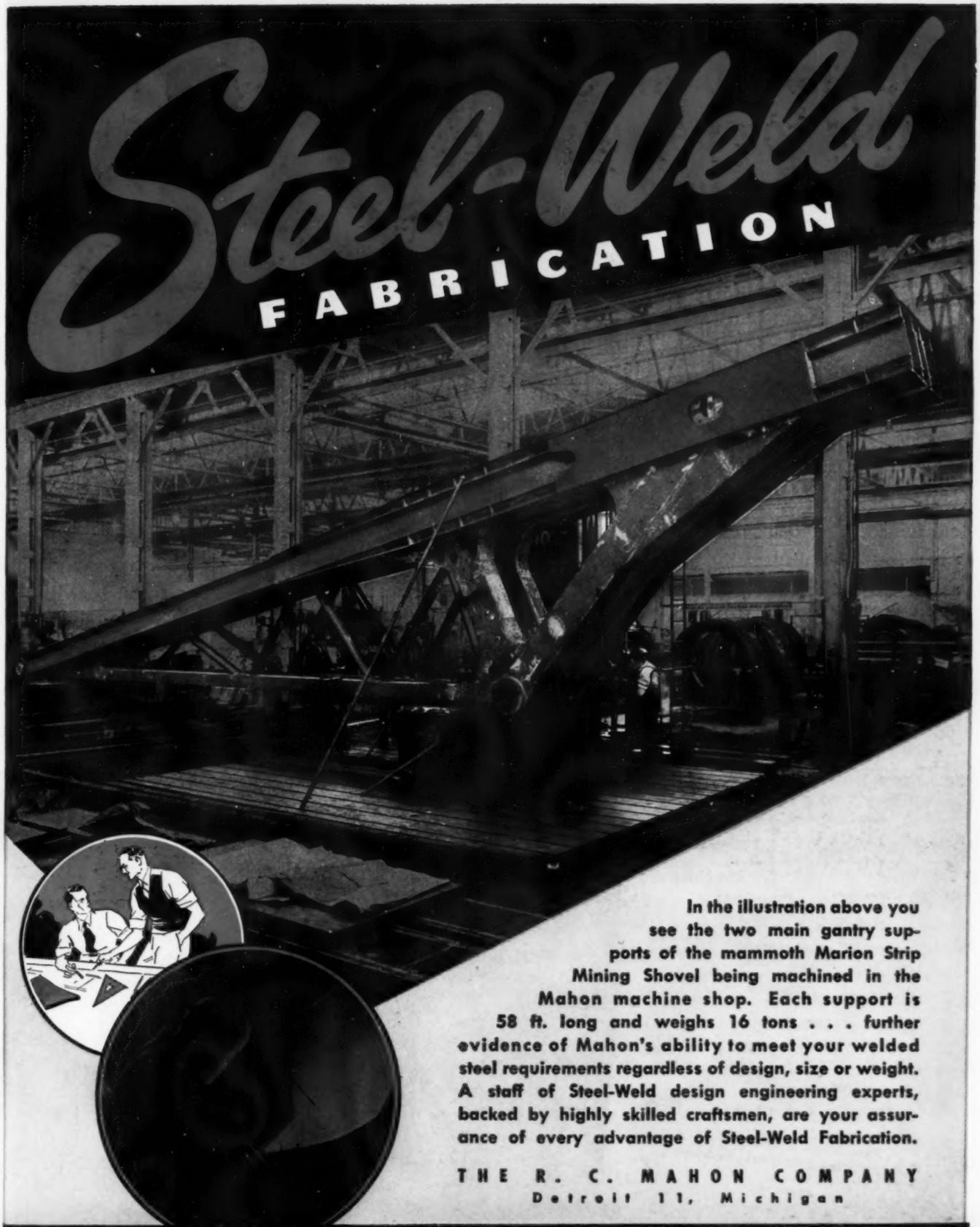
Steel-Weld FABRICATION



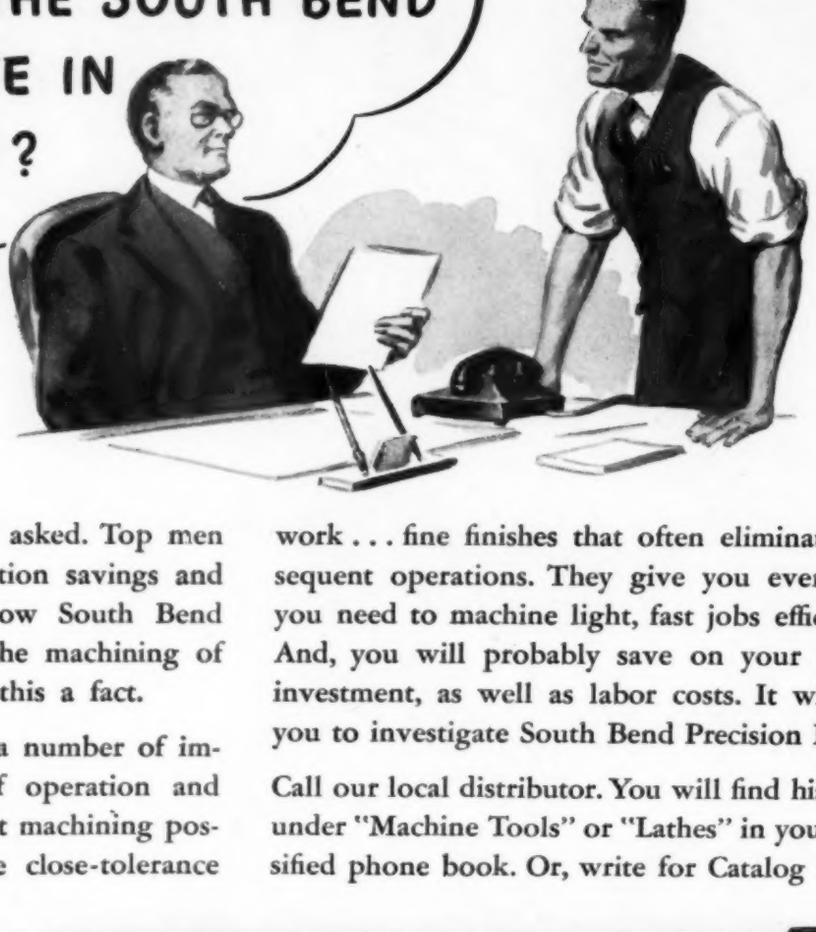
In the illustration above you see the two main gantry supports of the mammoth Marion Strip Mining Shovel being machined in the Mahon machine shop. Each support is 58 ft. long and weighs 16 tons . . . further evidence of Mahon's ability to meet your welded steel requirements regardless of design, size or weight. A staff of Steel-Weld design engineering experts, backed by highly skilled craftsmen, are your assurance of every advantage of Steel-Weld Fabrication.

THE R. C. MAHON COMPANY
Detroit 11, Michigan

Engineers and Fabricators of Welded Steel Machine Bases and Frames, and Many Other Welded Steel Products

MAHON

JIM, HAVE WE EVER INVESTIGATED THE SOUTH BEND LATHE FOR USE IN OUR PLANT ?



This question has often been asked. Top men who are interested in production savings and efficiencies are discovering how South Bend precision *pays.* Especially in the machining of small close-tolerance parts is this a fact.

South Bend Lathes offer you a number of important advantages: speed of operation and ease of handling that make fast machining possible . . . precision to facilitate close-tolerance work . . . fine finishes that often eliminate subsequent operations. They give you everything you need to machine light, fast jobs efficiently. And, you will probably save on your capital investment, as well as labor costs. It will pay you to investigate South Bend Precision Lathes.

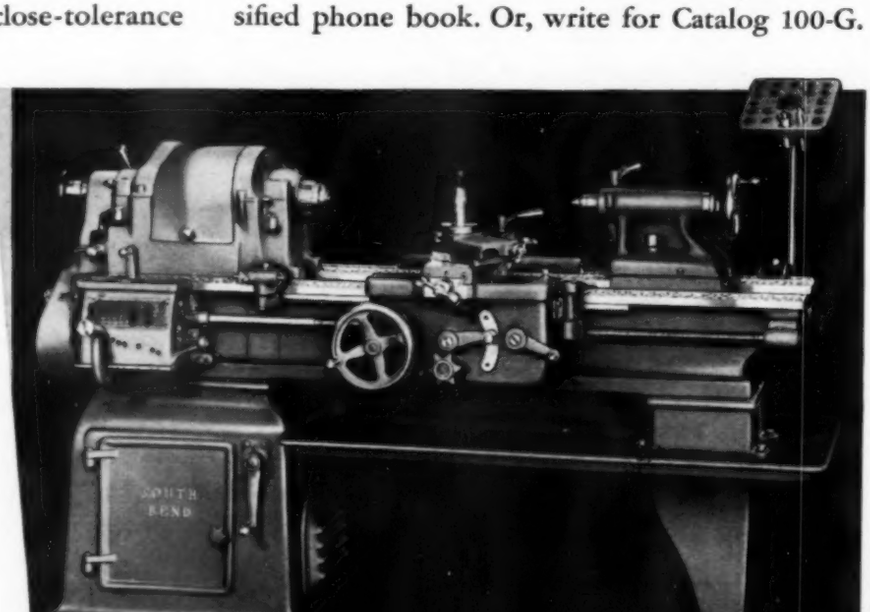
Call our local distributor. You will find his name under "Machine Tools" or "Lathes" in your classified phone book. Or, write for Catalog 100-G.

SOUTH BEND LATHES

PRICE LIST

Lathe Size	Quick Change Gear Model	Toolroom Model
16" x 6' Lathe	$1640.50	$2031.50
14-1/2" x 5' Lathe	1382.50	1735.50
13" x 5' Lathe	1153.50	1481.50
10" x 3' Lathe	863.60	1151.60
9" x 3' Bench Lathe	312.70	481.70

Prices include 3 phase, 60 cycle, A.C. motor, and drum switch—f.o.b. factory.



16" X 6' TOOLROOM LATHE with handwheel collet attachment; collet rack; taper attachment; micrometer carriage stop; chip pan; thread dial; 3 ph., 60 cy., 220 V. motor; and drum switch. Catalog No. 8117-C **$2031.50**

BUILDING BETTER TOOLS SINCE 1906

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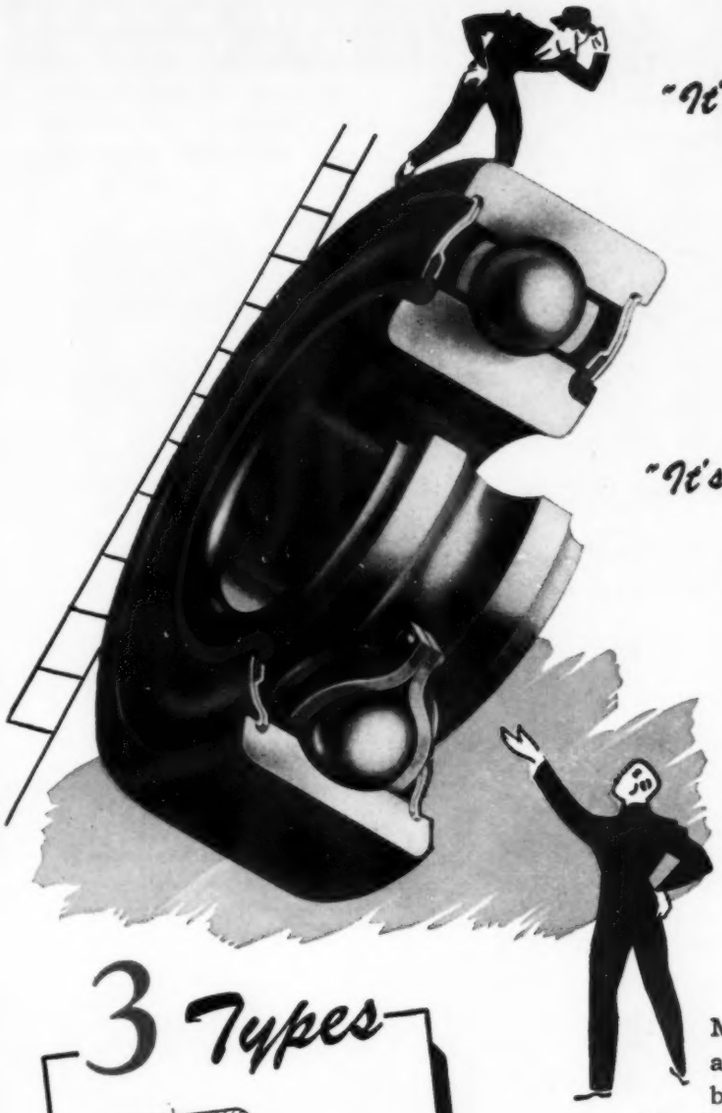

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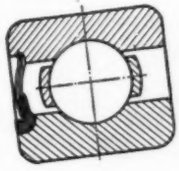
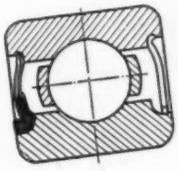
"It's made to Standard Single Row SAE widths!"

"It's Pre-Lubricated!"

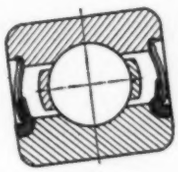
3 Types



RS
One Red Seal



RSZ
One Red Seal, One Plate



2RS
Two Red Seals

Meeting Industry's steadily increasing demands for an effectively sealed bearing that's safe from lubricant leakage and the entrance of abrasives and corrosives, SKF again puts the right bearing in the right place. This time it's with the pre-lubricated SKF Red Seal Bearing made to standard single-row SAE width and interchangeable with the conventional ball bearing which has no seal. This seal is designed to allow ample grease space for lubrication . . . for constant sealing ability and low operating temperatures at high speeds. For further information, consult your nearest SKF representative.

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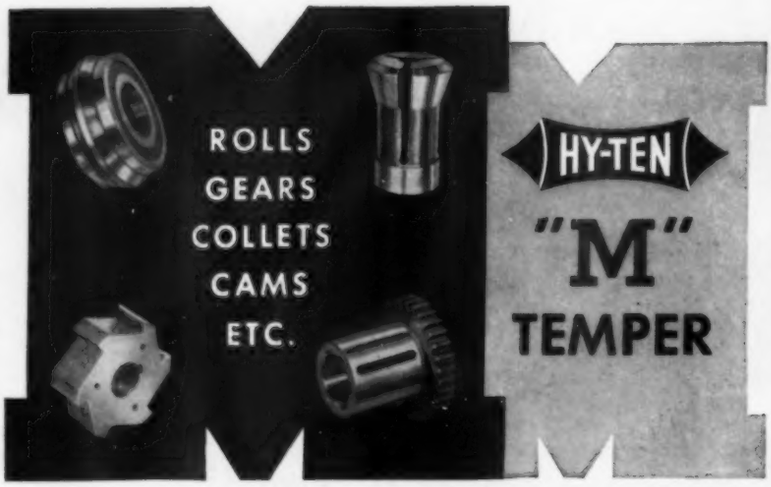
BILLETS AND FORGINGS FOR PRODUCTION, TOOL ROOM AND MAINTENANCE REQUIREMENTS.



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WL *steels are metallurgically constant. This guarantees uniformity of chemistry, grain size, hardenability—thus eliminating costly changes in heat treating specifications.*

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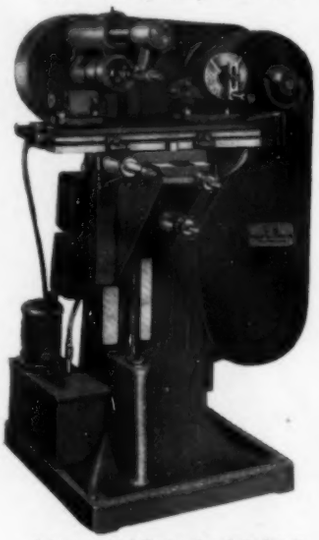

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MACHINE WORK JIGS, FIXTURES?
Get our prices on precision work!

● We offer expert service on any medium-size parts work, jigs or fixtures. Special machining . . . including centerless grinding . . . if needed. Our long-time experience saves you money . . . gets the job done *right*, and *on time*.

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ERIE builds the right hammer for the job . . . Here illustrated *in operation* are Erie Steam, Air, Board Drop and Pneumatic Hammers, Erie Single and Double Frame Forging Hammers, and Erie Trimming Presses . . . products of a half century of hammer design and building "know how". Erie engineers will consult with you on your requirements . . . write us before purchasing equipment for producing modern forgings.

All parts on Erie Hammers subject to impact, upper works, frames and anvil are steel.

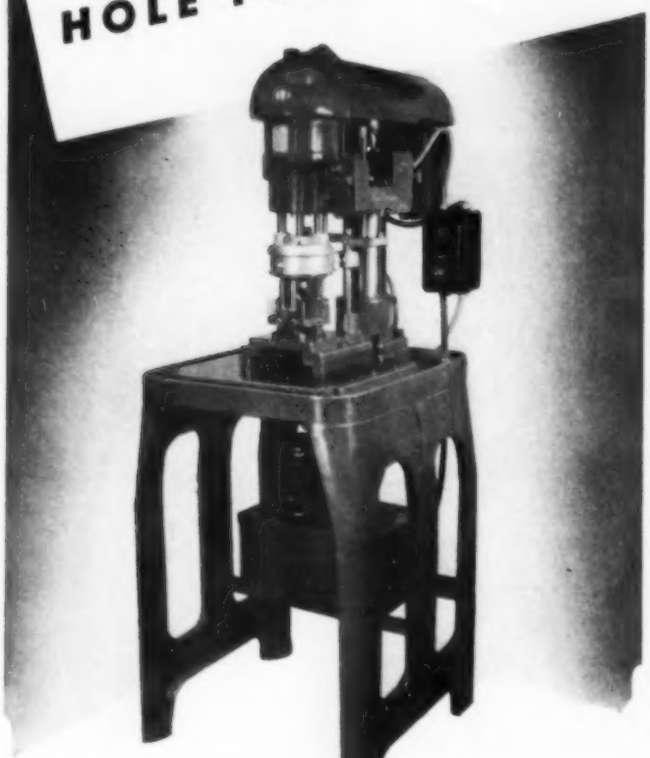
ERIE

Bulletins giving full details on any or all of these Erie products are available to you for the asking.

ERIE FOUNDRY COMPANY, ERIE, PA.

ERIE BUILDS *Dependable* HAMMERS

AN OUTSTANDING *new* DEVELOPMENT TO SPEED UP YOUR HOLE PRODUCTION



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AIR-ELECTRIC
DRILLING AND TAPPING MACHINE

Developed particularly for use with multiple heads, this machine makes it possible to drill or tap more than one part with different size holes simultaneously. It is featured by:

—New type trouble-free 4-way air valve.

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It is available in two models for light or heavy duty for single or continuous operation. Most Ettco drilling or tapping heads can be used with it without alteration.

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These assembly items are known throughout industry for their quality and precision.

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Sterling Stermounts are economical, easily used and efficient. Your letter will bring full information at no obligation.

The complete line of Sterling's Stermounts is shown in this new folder. Full description and prices . . . write for it!

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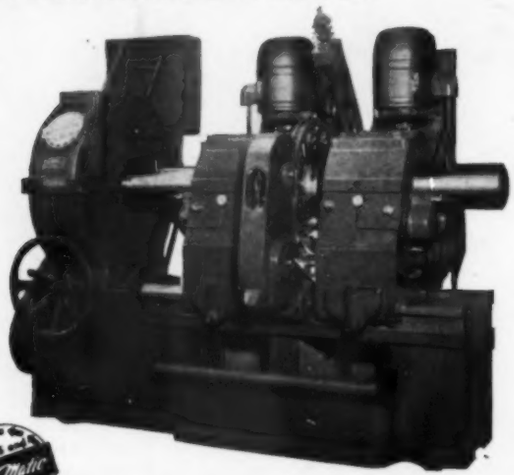
FEATURING

1 CONTINUOUS OPERATION
2 AUTOMATIC CHAIN CLAMPING
3 ROUGH & FINISH CUTTERS — EACH HEAD
4 3 TYPES — VARYING BED LENGTHS
5 LOW MAINTENANCE COST
6 INTERCHANGEABLE FIXTURES



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No. 1-A ROTO-MATIC Millers have been produced for the past 30 years in various sizes and types to do specific jobs faster and better than they have ever been done before. Because of their flexibility they have been designed to take a wide range of work with uniform satisfactory results. Engineering has made possible the milling of several work pieces at one time giving a high production of each. In all cases exacting requirements as to quality of work have been met.

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Double Drum—50 automatic holding fixtures on each drum for rough and finish milling radius on Rocker Arms — Production 1400 gross per hour.

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DAVIS and THOMPSON CO.
MANUFACTURERS OF *Machine Tools*
MILWAUKEE 14, WISCONSIN

Whatever your problem in finishing zinc or cadmium, there's an Iridite* to do the job. Iridite, a quick-dip, chemical treatment, offers you these three advantages—

Radio and hardware parts, permanently brightened with Iridite.

1. EYE APPEALING FINISH

On plated parts Iridite forms a long lasting, sparkling *bright* finish that *stays bright*, even after handling, storage, exposure. On all surfaces, Iridite can be used to produce a variety of colored finishes.

Wire cloth and galvanized bucket, Iridited for extreme corrosion-resistance.

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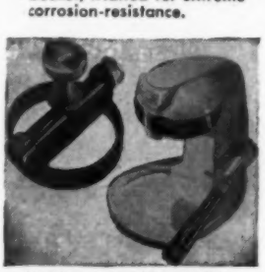
Resistant to the attack of water, gasoline, and ordinary corrosive conditions, Iridite provides the ideal *final finish* for all zinc and cadmium surfaces.



Hardware products, Iridited and painted for peak finishing system efficiency.

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On any zinc or cadmium surface that must be painted, Iridite insures a better finishing system because the coating improves initial paint adherence, blocks corrosion *under* paint, blocks formation of metallic soaps *between* paint and metal.

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Back of Cleco Products... with 25 years experience in precision manufacturing, is the REED ROLLER BIT COMPANY, one of the largest companies of its kind in the world.

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Available in 6 sizes, 000 to 3.

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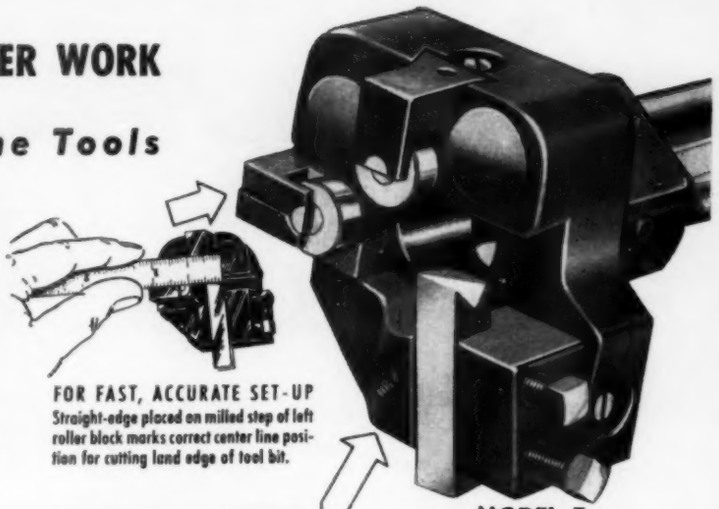

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Straight-edge placed on milled step of left roller block marks correct center line position for cutting land edge of tool bit.

Tool steel can be removed from tool bit holder, sharpened and returned to holder in the correct position with a minimum of down time.

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In Three Sizes, 00, 0 & 2

Model DRH Adjustable Drill and Reamer Holder. In Three Sizes

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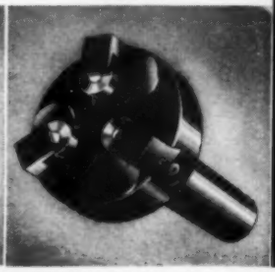

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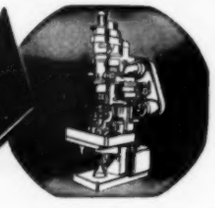

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IN ONE HOUR

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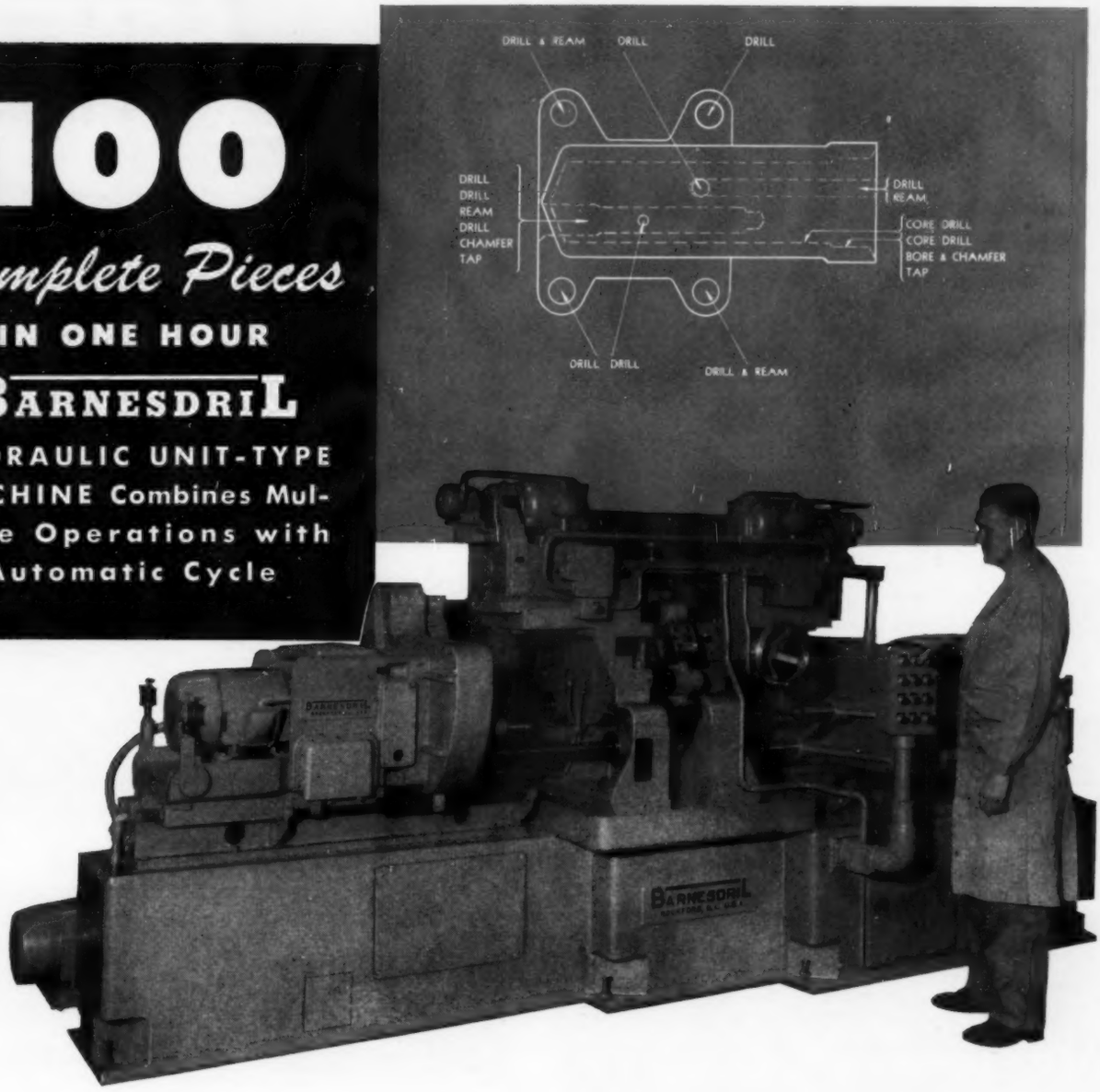

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These cast iron hydraulic accumulator housings have a total of eighteen operations for drilling, reaming, chamfering and tapping. 100 complete housings per hour are produced on this special BARNESDRIL Production Unit-Type Machine. Arranged with automatic cycle and drum type automatic indexing table, the machine has 4 self-contained horizontal opposed units and 2 vertical lead screw tapping units. All eighteen operations are combined in one automatic cycle of the machine, requiring the operator to load and unload only. Non-productive machine time and work handling have thus been reduced to a minimum.

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Cutting Tools

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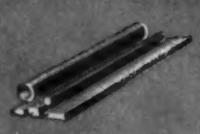
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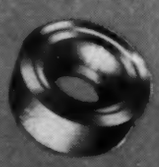
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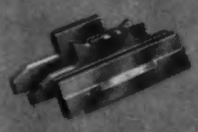
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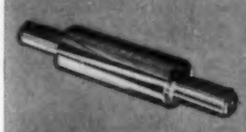
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Full Details of the Barrett Cyclone Dryer Sent Promptly on Request.

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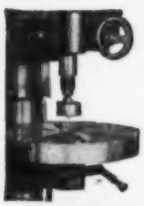
Designers and Builders of Centrifugal Machinery



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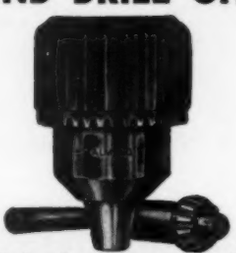

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Table, 32" x 9"
Table travel, 14"

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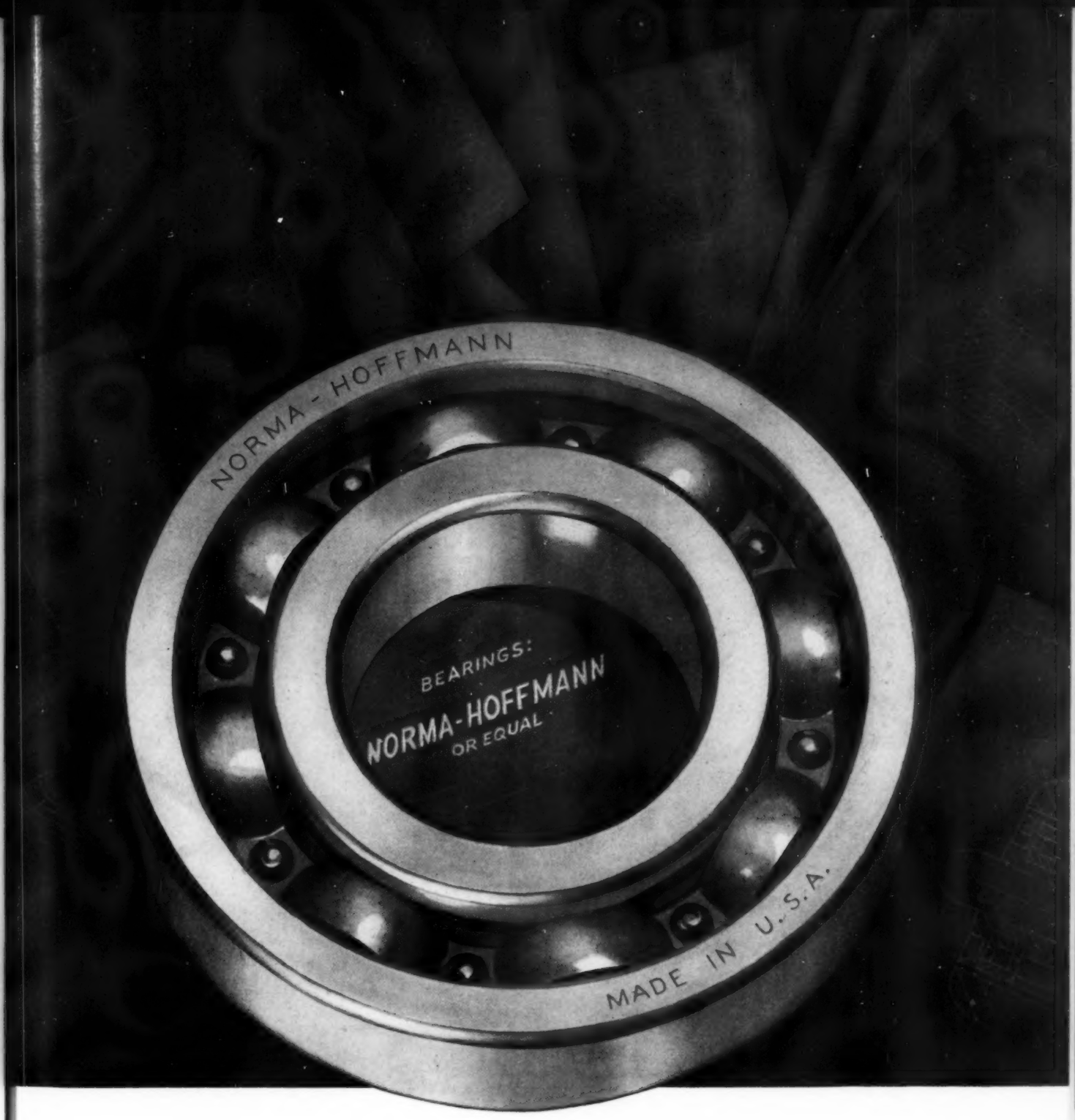
Federal Electric Products Company, Manufacturers of a Complete Line of Electrical Products including Motor Controls • Safety Switches Service Equipment • Circuit Breakers • Panelboards • Switchboards • Bus Duct



Here's a Proved way to set High-Standards in Design

When you've been around for 30 years you're bound to earn some sort of reputation. That's happened to Norma-Hoffmann bearings, and, in thousands of blueprints it gets put down in "blue and white" like this: *Norma-Hoffmann or equal.*

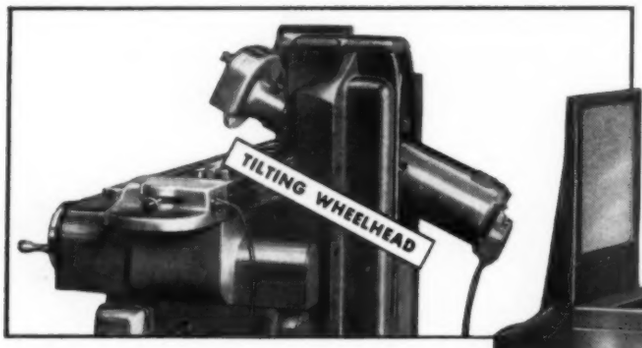
Designers tell us there are extra values in these bearings. That they can specify Norma-Hoffmann and right there a worry is off their minds.

We have certainly set up high enough standards to assure delivering these extra qualities. There's no secret how. It's explained in one word: *precision.*

NORMA-HOFFMANN
Precision
BEARINGS
BALL • ROLLER • THRUST

NORMA-HOFFMANN BEARINGS CORPORATION, STAMFORD, CONNECTICUT • FIELD OFFICES: New York, Chicago, Cleveland, Detroit, Pittsburgh, Cincinnati, Los Angeles, San Francisco, Dallas, Seattle, Phoenix

You Get *Easier Set-Ups*



and *Effortless Operation* with the

TAFT-PEIRCE

No. 1 Precision Surface Grinder

Because the Taft-Peirce No. 1 Precision Surface Grinder has full ball-bearing construction and hardened and ground steel V-ways, operation is smooth and effortless, wear is reduced to a minimum, and accuracy is maintained.

Specially designed to produce surfaces which are flat within extremely close limits of tolerance, this surface grinder eliminates many complicated tool set-ups. Equipped with the exclusive Taft-Peirce Tilting Wheelhead, which can be set to any angle from horizontal to 30° below center, it speeds up and simplifies difficult angle and shoulder grinding. For any work up to 5″ x 12″ x 12″, this unique surface grinder will save you both money and time in grinding tools, gages, and precision parts.

Write for illustrated bulletin.

The TAFT-PEIRCE Mfg. Co.

Woonsocket T-P **Rhode Island**

T-P *means* TOP PRECISION

ALL WORK—and NO PLAY!

ORANGE *Cage Design*

assures permanent alignment of rollers —prevents skewing

- ✔ **Can be used on vertical or overhung applications**
- ✔ **Less affected by misaligned mountings**

"JUST WHAT WE NEED!" say design engineers after studying the construction and advantages of Orange Cage Type Needle Bearings. These bearings open new applications—overcome present limitations in the use of needle bearings.

In Orange Cage Type Needle Bearings, square end rollers run in a cage made of anti-friction, non-ferrous metal. This holds rollers in permanent alignment. The cage land revolves on the outer race, preventing cage pockets from wearing on rollers. Pockets are coined to contour of rollers. All rollers and raceways are "Pentrate" finished. There is less internal friction—smoother, quieter running—longer life hours expectancy.

Write for further details—or have one of our engineers call, without obligation.

Ideal for
SPINDLES and HIGH SPEED APPLICATIONS
because internal clearances can be precisely controlled to meet exacting requirements.

ORANGE
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NEEDLE BEARINGS

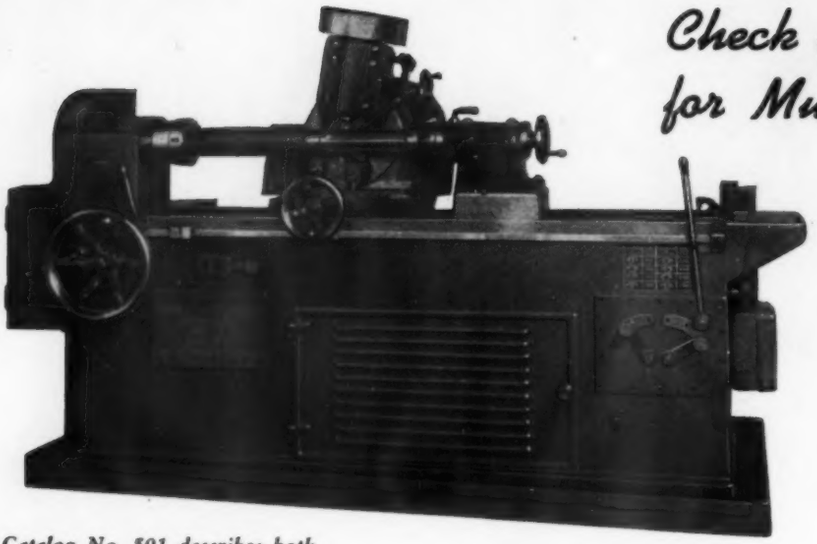
SEND FOR ENGINEERING DATA
showing construction, advantages, sizes, etc.

ORANGE ROLLER BEARING CO., INC. AM
ORANGE, NEW JERSEY

Gentlemen:
Please send me Engineering Data on new Cage Type Needle Bearings.

Name.....Title.....
Company.....
Address.....
City.....State.....

ORANGE ROLLER BEARING CO., INC.
554 Main Street, Orange, N. J.



Check your Production Costs for Multiple Splined Shafts and Spur Gears---

Then Check These Cost-Cutting Features of ADAMS MANUFACTURING HOBBERS

Catalog No. 501 describes both models of the Adams Manufacturing Hobber; also the Adams Gear Hobber and Thread Miller. Write THE ADAMS COMPANY, 1905 Bridge St., Dubuque, Iowa.

- EXTREME PRECISION—Exceptionally close tolerances for high standard products and fewer rejects.
- GREAT RIGIDITY—The original accuracy is maintained throughout a long period of service.
- SIMPLE SETUPS—Adaptable and equally effective on short runs and production lots.
- DESIGNED SPECIFICALLY for high standard spur gear and splined shaft hobbing.

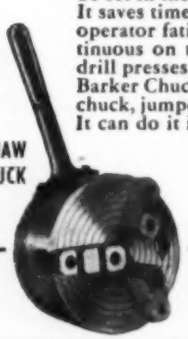
The ADAMS Company, Dubuque, Iowa, U. S. A.

HOBBER AND THREAD MILLER . . . MANUFACTURING HOBBER . . .

Barker **Two-Jaw or Three-Jaw WRENCHLESS CHUCK**

will pay for itself in 60 to 90 days on production schedules by giving MORE parts per hour at a LOWER cost per part. Most round parts can be set in the Barker Wrenchless Chuck without stopping the machine. It saves time, helps speed up production, is simple to operate, reduces operator fatigue and cuts spoilage where the run is continuous on turrets, engine lathes, cutting off machines, drill presses or any other type of chucking machine. The Barker Chuck shown above, replacing an ordinary 3-jaw chuck, jumped production from 18 to 24 pieces per hour. It can do it in *your* plant too. Let us show you how!

Write for bulletin 201 today.



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THOMAS HOIST CO.
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DIE CUSHIONS

. . . for every punch press operation

Dayton Rogers Mfg. Co.
MINNEAPOLIS 7, MINN.

your solutions
are here

Preparing Metal Surfaces for Paint Japan, Lacquer Finishes

Minimize finish failures caused by improper paint adhesion. Surface condition with Oakite CrysCoat to remove light soils, cutting, stamping, compounds. Impart microscopic phosphate coating to which paint grips firmly. Inhibit rust before finishing; localize corrosion if finished surface is broken. Write for Service Report 6731. Free!

Cleaning Metal Parts After Buffing Operations

Presoak in self-emulsifying solvent material such as Oakite Composition No. 7, Oakite Composition No. 9 or Oakite Saturol. Penetrating action cuts thru heavy compounds, shop dirt. Follow with alkaline cleaning using Oakite Composition No. 19, 4 to 6 oz./gal. hot water. Deposits completely removed. Metal ready for further processing. Full data free.

Stripping Oil-Base Paint, and Other Organic Finishes

Use Oakite stripping materials and methods for complete, speedy removal of paint, etc. In tank, hot flow-on or steam gun method, Oakite materials rapidly break up adhesive surface finishes. Also remove heavy oil and grease deposits. Non-flammable. No corrosive effect on ferrous metals or magnesium alloys. Send for details. Report A-5920.

Cleaning Aluminum before Anodizing

Use Oakite Aviation Cleaner or Oakite Compound No. 61, 4 to 6 oz./gal. of water, 150° to 212° F. Soak 3 to 10 minutes; follow with thorough rinse. Thorough cleaning action speedily removes shop dirt and oil. Used as recommended Oakite materials are completely safe to metal: no pitting or discoloration. Free booklet gives story.

Pickling Ferrous Metals To Remove Scale and Oxides

Immerse work in pickling solution made up with Oakite Pickle Control or Oakite Pickle Control No. 3. Effective aid to better pickling produces clean work; remains stable; reduces evolved hydrogen; lessens attack on metal; saves acid; rinses completely. Efficient at 1.0% by weight of the concentrated acid used. Send for free report 4880R.

Your Production Cleaning Problem Invited

No matter what product you make, it will pay you to talk over the dip, brush, spray or electrolytic cleaning problems with your nearby Oakite Technical Service Representative. Put his wide metal-cleaning experience to work for you to speed your production . . . reduce rejects . . . cut costs. Arrange for his free service, today, or drop us a line for data on any cleaning problem. No obligation, either way.

OAKITE PRODUCTS, INC., 22A Thames St., NEW YORK 6, N. Y

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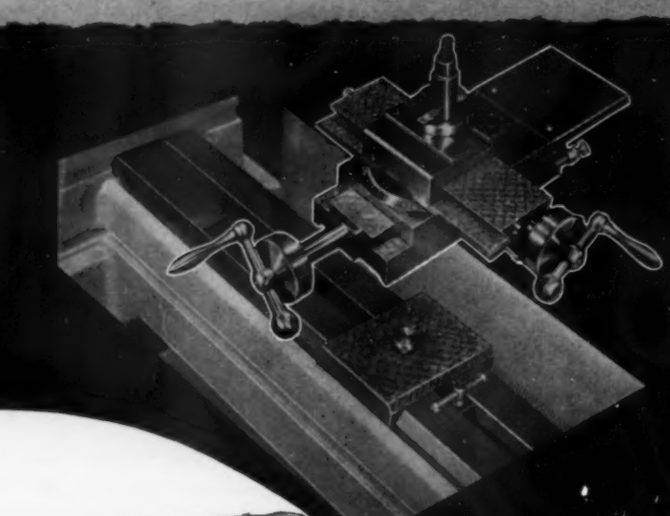
MATERIALS
METHODS
SERVICE

Specialized Industrial Cleaning

ANOTHER *Plus* FEATURE OF THE *New* RIVETT 918 "STEELWAY" CABINET LATHE

SELF-ALIGNING SLIDE REST



On most bench or cabinet type lathes, the compound slide rest aligns against the front narrow edge of the bedway. Such alignment is not automatic or foolproof but depends entirely upon the operator. This type of mounting also makes it difficult to change the lateral position of the slide rest on the bed.

The compound slide rest of the Rivett 918 "Steelway" cabinet lathe mounts in any lateral position on a self-aligning shoe. Beveled edges of the shoe automatically square the slide rest with line of centers. The ability to position laterally is valuable on facing large diameters. Hardened and ground feed screws with large 2" diameter dials add to the precision of the lathe.

No other lathe has comparable slide rest features.

WRITE FOR BULLETIN 918SL.

SPINDLE SPEED SELECTION

Correct spindle speed for any operation. Control lever affords any speed ranges from 120 to 2800 or 180 to 3750 r.p.m. Selected speed shows on dial.

RIVETT

RIVETT LATHE & GRINDER, INC.

BRIGHTON · BOSTON · MASSACHUSETTS · U. S. A.

YOU

can profitably use one or more of these ROTARY IMPACT TOOLS

NO KICK
NO TWIST
EVEN ON THE TOUGHEST JOBS

AMAZING all-purpose ELECTRIC TOOL will

- Drill up to 1/4" dia.
- Ream up to 1/2" dia.
- Tap up to 1/2" dia.
- Run Nuts up to 3/8" dia.
- Drive Screws up to 3/8" dia.
- Hole Saw up to 1 1/2" dia.
- Bore Wood up to 29/32" dia.
- Drive Studs up to 3/8" dia.
- Drill Masonry up to 3/8" dia.
- Extract Broken Studs up to 3/8" dia.
- Wire Brush up to 3/8" dia. shanks.

(Uses Standard Attachments)
(110 V or 220 V Models available)

Only one Ingersoll-Rand *all purpose* Impact Tool is required to perform all of the operations listed. The ratings are very conservative and many jobs in excess are being easily handled by the powerful "rotary impacts".

What other electric tool will permit you to do these tough operations without any kick or twist to the operator? Plug it in any wall socket—it is reversible with full power in either direction—it weighs only 6½ pounds, but what an amazing tool for getting all those jobs done!

Ideal for installation crews—one manufacturer has equipped his installation crews with IMPACT Tools and attachments. Now, in place of 3 or 4 electric tools they carry only one and also save from 10 to 20 percent of the installation time.

Don't hesitate, call your nearest distributor now for a demonstration of this labor saving—time saving *all purpose* IMPACT Tool. They're available for immediate delivery.

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Thor IMPACT WRENCHES

UNMATCHED for POWER—

OVER 1000 HARD BLOWS A MINUTE—

Setting SPEED and LOW COST

Records on Scores of Jobs!

METAL FABRICATING

RAILROADS
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Three men on a wrench can tug at a frozen nut a hundred times—but it's the *one hard yank* that finally spins the nut loose. On that same principle is based the overwhelming acceptance of new Thor Air Impact Wrenches. The Thor Wrench hits HARD once on every revolution of its rotor—and with more than 1,000 of these hard impacts a minute is outperforming everything in its class . . . for *speed* in driving nuts, bolts or cap screws—for *stamina* in standing up longer under impact shock—for *proving the best money saver* on every job! Call a Thor branch today for a convincing demonstration.

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Thor **PORTABLE POWER TOOLS**

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

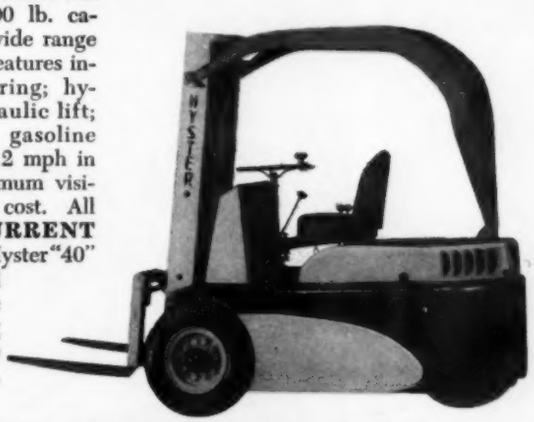
7 OUT OF 10 MATERIALS HANDLING PROBLEMS ARE SOLVED BY THE...

HYSTER 40

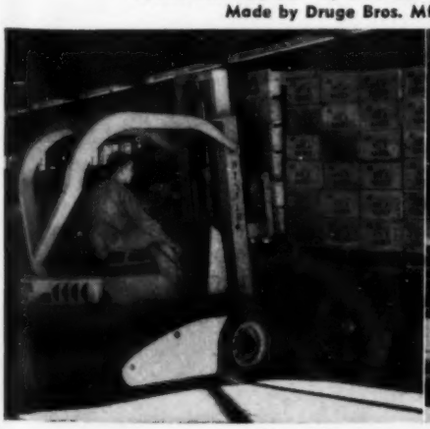
Here's the lift truck that has been engineered and built to do *more* jobs in *more* industries *THAN ANY OTHER LIFT TRUCK ON THE MARKET*. This 2 ton capacity unit on pneumatic tires works indoors or outdoors, on rough or smooth surfaces; hoists, transports and tiers heavy or bulky loads easily, quickly, economically.

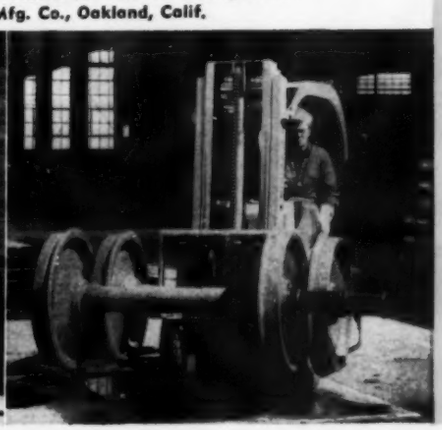
PNEUMATIC TIRES! CURRENT DELIVERY!

Pneumatic tires are easier on loads and floors. 4000 lb. capacity is ideal for a wide range of industries. Added features include trunnion steering; hydraulic brakes; hydraulic lift; powerful air cooled gasoline engine; speed up to 12 mph in either direction; maximum visibility; low operating cost. All of this, **PLUS CURRENT DELIVERY**, marks Hyster "40" as a money, time and labor saving machine that should be working for you right now. See your Hyster distributor. Write for literature.



Hyster Scale Model Toy Straddle Trucks for sale at leading stores. Made by Druge Bros. Mfg. Co., Oakland, Calif.





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CURTIS "LO-FRICTION" UNIVERSAL JOINT Sets New "Standards"

Actual photo shows NEW CURTIS LO-FRICTION Universal Joint at top (driving end) and a Curtis Standard Joint at bottom (driven end) in dynamometer test with load and angle increased beyond safe limits. NOTE: Standard joint shows excessive heating — approaching failure — while NEW LO-FRICTION joint ran cool and handled overload successfully.

FRICTION — The bug-a-boo in offset drives for power transmissions has been greatly reduced, effectively, yet simply, in this NEW CURTIS LO-FRICTION UNIVERSAL JOINT now available for industrial applications.

Note that two (2) grooves on each of the four (4) bearing surfaces of the center block break each surface into four smaller areas making sixteen bearing faces. By reducing the size of frictional areas, wear is more evenly distributed, lubrication is transmitted more effectively, and friction heat, or kinetic energy, is dissipated, thus increasing joint life and efficiency tremendously.

After many tests, all resulting in the same answer, Curtis has made patent application and is now ready to supply this new LO-FRICTION industrial universal joint in sizes from 1¼" up, either single or double, or in special joints made to your specifications.

Write Dept. B-3

CURTIS UNIVERSAL JOINT CO. INC. SPRINGFIELD MASS.

This was once the "LAST WORD" in hardness testers

YES, it was a real "ROCKWELL" Hardness Tester—a very early model—and a marvelous instrument in its time. It would contrast oddly with a modern "ROCKWELL" Hardness Tester. Yet there has been even more dramatic improvement in the whole science of hardness testing — due largely to the Wilson Standardizing Laboratory. Here ways are constantly being developed to make BRALE Diamond Penetrators even *more* permanently accurate —to make our test blocks even *more* uniformly dependable. In hardness testing equipment, we are not content to meet the requirements of industry. We try to anticipate them.

Also makers of the TUKON Microhardness Tester.

WILSON MECHANICAL INSTRUMENT CO., INC.

AN ASSOCIATE COMPANY OF AMERICAN CHAIN & CABLE COMPANY, INC.

230-B PARK AVENUE, NEW YORK 17, N. Y.

ACCO

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THE W&BCo

ECONOMY Lubricant 1888
fluid type - water soluble
For Grinding and Cutting

Rapid mixing in all waters, clean stock removal, increased production

THE WHITE & BAGLEY COMPANY
WORCESTER, MASS. • DETROIT, MICH.
Originators of Grinding Lubricants

get all these

ADVANCED DESIGN FEATURES

in your next
Power
Press Brake

- **MOTOR-DRIVEN SLIDE ADJUSTMENT** . . . slide easily operated in parallel or non-parallel position with base. Counters on each end indicate magnitude of adjustment in thousandths of an inch. Slide ways provide full bearing with housing guides in all slide positions.
- **MULTIPLE DISC FRICTION CLUTCH** of exclusive Columbia design for dependable performance.
- **HIGH-EFFICIENCY FRICTION BRAKE,** positively holds slide at any part of the stroke.
- **LOW DEFLECTION SLIDE AND BASE.** Maximum deflection, .001" per foot of machine width.
- **WEDGE TYPE RELEASE MECHANISM** relieves the ram in case dies are bottomed to the extent that the brake is stalled.
- **STURDY ROLLED STEEL PLATE CONSTRUCTION** of slide, base and top cross tie provide strength, rigidity, accuracy and durability.
- **CUT STEEL GEARS OPERATE IN OIL.** Precision machine-cut steel gears; first drivers helically-cut, operate in oil-tight case.
- **ONE-PIECE FORGED ECCENTRIC.** Heat-treated high-carbon steel with eccentrics forged integrally.
- **CENTRALIZED LUBRICATION.** Centralized lubricating system provides positive, adequate lubrication to all bearings.
- **SAFETY ENCLOSED DRIVE.** Motor pulley, flywheel and V-Belt drive fully enclosed.

Columbia Power Press Brakes are of 120 tons capacity and will form mild steel $\frac{7}{16}$" x 4 ft., $\frac{5}{16}$" x 6 ft., $\frac{1}{4}$" x 8 ft. or $\frac{3}{16}$" x 10 ft. at 30 strokes per minute.

. . . WRITE FOR BULLETIN 106A . . .

IMMEDIATE DELIVERY

Columbia
STEEL SQUARING SHEARS

If you need squaring shears, it will pay you to investigate Columbia's advanced design features. Ask for Bulletin 105A.

Columbia
POWER PRESS BRAKES

COLUMBIA MACHINERY & ENGINEERING CORP. HAMILTON, OHIO

STEEL SQUARING SHEARS

EDWARD **Blake** COMPANY

NEWTON CENTRE 59
MASSACHUSETTS

THE BLAKE FLUTE GRINDER

PROVED BY
Test

PROVED BY
Production

TEST—A brand new tap cut 2,800 holes before running under size—another tap, out of the same box, was sharpened on a Blake Flute Grinder and cut 9,400 holes! The new tap consumed 50% to 100% more power than the Blake Sharpened Tap. (Write for the full story on how this test was made.)

PRODUCTION—The Blake Flute Grinder has all facilities for quantity production and quick changeover. Taps up to ⅝" diameter can be ground. Leading metal-working companies and tap manufacturers use the Blake Flute Grinder to guarantee precision and lengthen tap life. Use the handy coupon for complete details.

EDWARD BLAKE COMPANY A.M.
634 Commonwealth Avenue, Newton Centre 59, Mass.

Please send Flute Grinder Bulletin No. 466 and complete report on test mentioned above.

NAME_____ DATE_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____

BLACK DIAMOND PRECISION DRILL GRINDERS • BLAKE TAP GRINDERS • BLAKE FLUTE GRINDERS • WALTHAM CUTTER SHARPENERS • WALTHAM THREAD MILLERS • AMERICAN TOOL HOLDERS • SURFACE FINISH STANDARDS

NEW ADJUSTABLE DRILLHEAD
FULL BALL BEARING
by Thriftmaster

FEATURING

- √ Universal Joint drive.
- √ Flexibility of operation.
- √ Unusually strong construction.
- √ High overload capacity throughout.
- √ Special alloy, test hardened gears, and spindles.
- √ Made for right hand rotation of drill press.
- √ Sufficiently rugged for use with power feed.
- √ Rated at full capacity of ¼" drill in steel.
- √ Furnished with 2—6 spindles, minimum 1⅛" center spacing within 6¼" diameter circle.

For complete engineering information, write to: Engineering Department Thriftmaster Products Corporation, 1048 N. Plum St., Lancaster, Pa.

DETROIT (21) B. E. Parish Company
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THRIFTMASTER
Multiple Spindle Drillheads
FIXED AND ADJUSTABLE CENTERS

of TRIMMING FORMED PARTS
and performing a host of other metal cutting jobs!

The negligible down-drag and the ability of Tannewitz High Speed Band Saws to cut sheet metal from 90° to near 0 or 135° at tremendous speed make these machines ideal for trimming. Cuts can be made with perfect safety without using a rest of any kind. Friction sawing with Tannewitz High Speed Band Saws also results in perfectly amazing time savings in the cutting of flat sheets, soft or hardened steels, armor plate, plastics, glass and many other materials. Whatever your cutting problem, chances are it can be done better and faster with Tannewitz Band Saws. Investigate this "Super" method of cutting.

Write for Your Free Copy

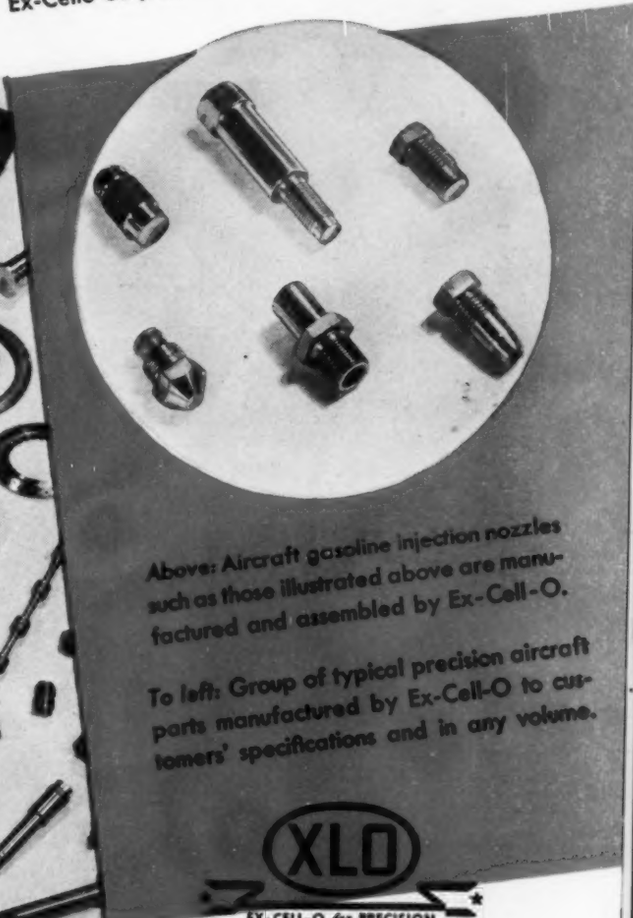
FRICTION SAWING *with* Tannewitz
HIGH SPEED BAND SAWS

THE TANNEWITZ WORKS GRAND RAPIDS 4, MICHIGAN

DEPEND ON EX-CELL-O

You don't take chances when Ex-Cell-O builds your aircraft parts and assemblies

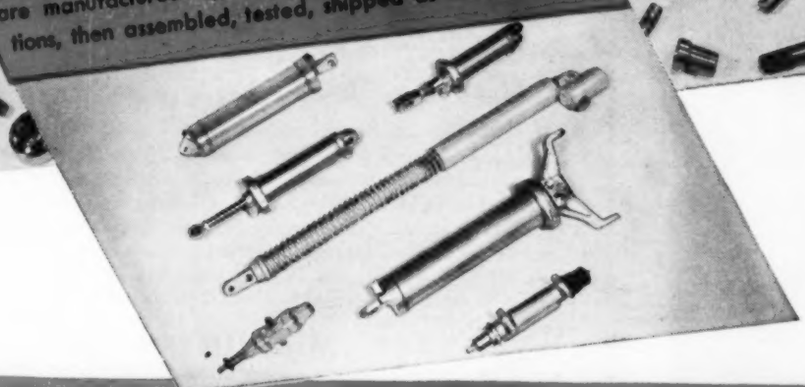
Ex-Cell-O is a pioneer in bringing accuracy and high production to the manufacture of metal parts and assemblies for aircraft engine builders and other aviation industries. . . . Three huge Ex-Cell-O plants in Detroit have the most modern and complete facilities for rough and finish machining of precision parts from bar stock, forgings and castings, for heat treating all types of work in large or moderate quantities, for assembling parts with highly skilled supervision and inspection . . . all under one experienced, responsible management. Ex-Cell-O works exactly to the customer's specifications and ships the parts in whatever volume is required. . . . Send Ex-Cell-O a sketch, sample part, or a blueprint for quotation, or get in touch directly with the Head Office of Ex-Cello Corporation, 1200 Oakman Blvd., Detroit 32, Mich.



Above: Aircraft gasoline injection nozzles such as those illustrated above are manufactured and assembled by Ex-Cell-O.

To left: Group of typical precision aircraft parts manufactured by Ex-Cell-O to customers' specifications and in any volume.

Below: Individual parts of these aircraft sub-assemblies are manufactured by Ex-Cell-O to customers' specifications, then assembled, tested, shipped as complete units.



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Special Multiple Way-Type Precision Boring Machines • Special Multiple Precision Drilling Machines • Other Special Purpose Machines
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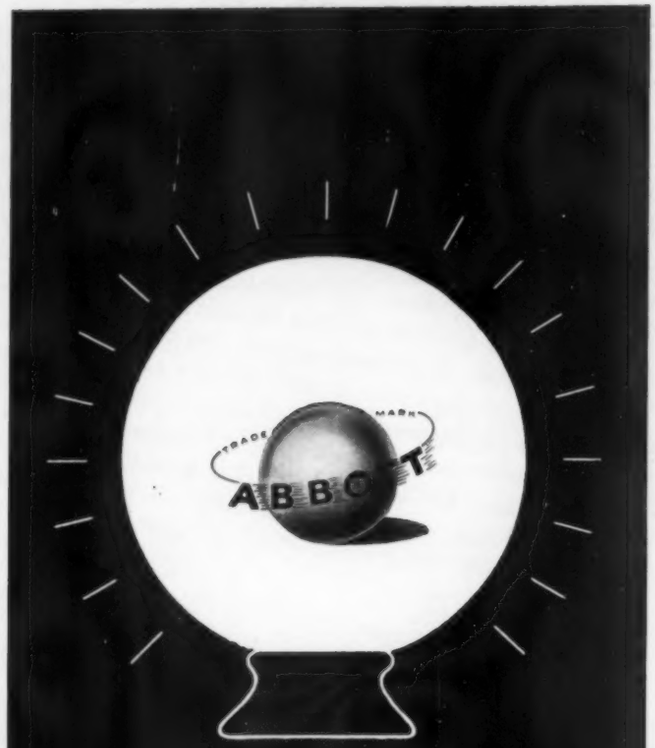
Continental Cutting Tools • Broaches and Broach Fixtures • Counterbore Sets • Face Milling Cutters • Grinding Spindles



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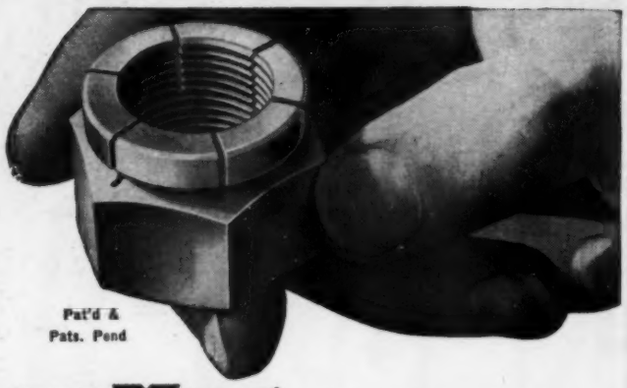

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The one-piece, all-metal "Flexloc" packs maximum usefulness in minimum space by combining, as it does, a stop, a lock and a plain nut all in one.
Every thread—including the locking threads—takes its share of the load. "Flexloc" accommodates itself to a wide range of thread tolerances . . . can be used over and over again without losing much of its locking torque . . . is not affected by temperatures likely to be met within the field of Mechanical Engineering . . . and being a "stop" nut, it stays locked in any position on the threaded member. The "Flexloc" is processed to have an exceptionally uniform torque.
The *Thin* "Flexloc" has become very popular because its *tensile* is so high and the space it occupies so small.
Sizes from #6 to 2" in diameter—in "regular" and "thin" types—in NC and NF thread series. *Write for "Flexloc" Catalog.*

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"Standard" ROLLING MILLS

FOR HOT OR COLD ROLLING OF STRIP, ROD AND INGOT

Speeds are provided for rolling metals in any range to 1000 feet per minute and tandem mill stands are designed with constant torque to synchronize stock between stations. Two, three, or four high Mills have roll sizes from 1½" diameter and 1" face to 16½" diameter and 18" face. Special units are also available for grading, cross and pinch rolling, forming wire to exact dimensions and for various shaping operations. Write for Catalog RM.

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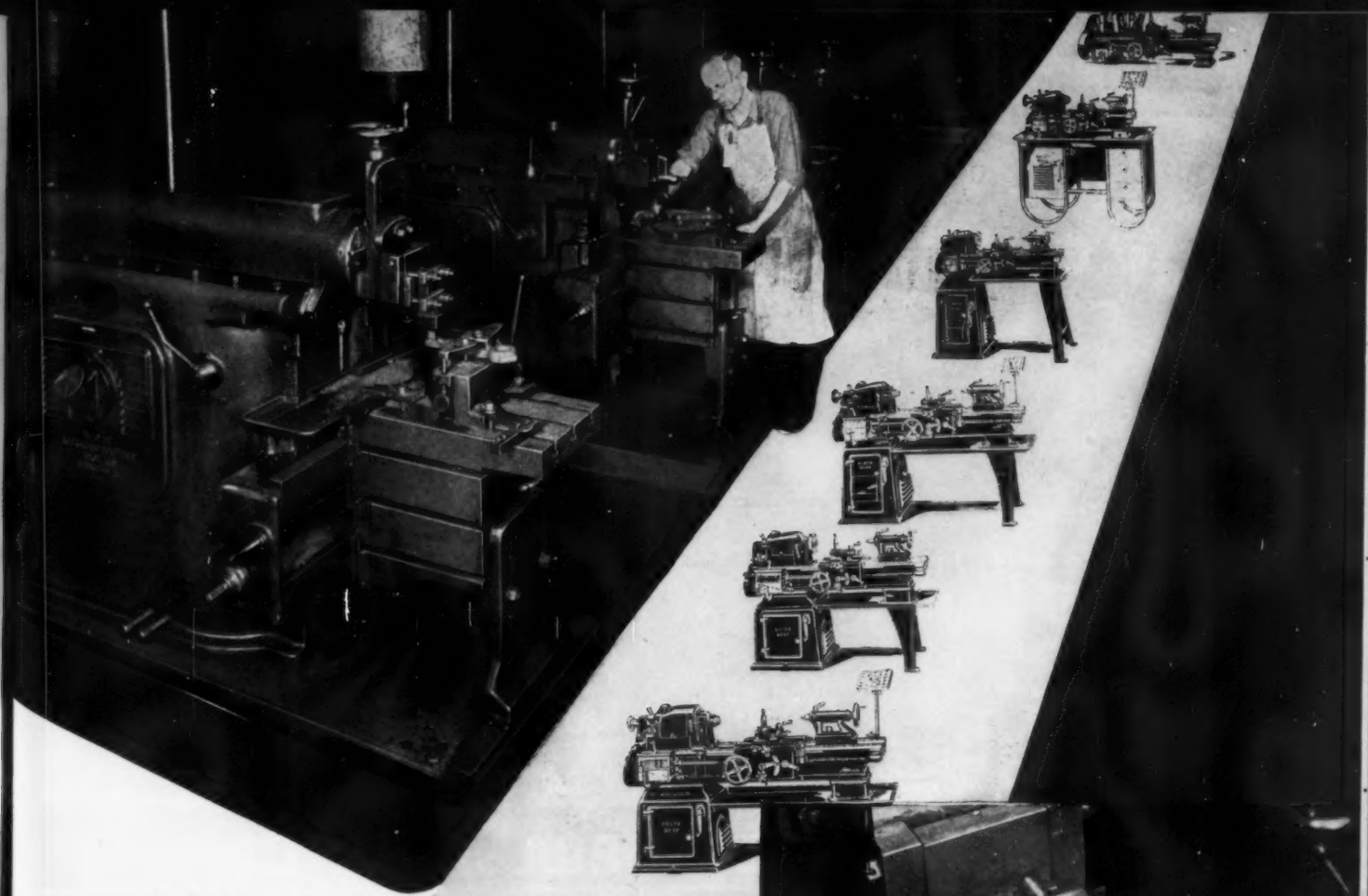
MANUFACTURERS OF Power Presses to 500 Tons Rolling Mills • Swagers • Turks Heads • Steel Die Sets



machine tools
to help make machine tools

It's generally conceded that the most critical buyers of machine tools are the machine tool builders themselves. The South Bend Lathe Works are typical.

Should you go through the South Bend plant you would see Rockford Hy-Draulic Shapers applied to many different types of work. For example, one job involves a difficult shoulder cut on a Change Gear Bracket. Two shoulders are cut at one time . . . up to a blind shoulder. Tolerances of plus or minus 0.001" are maintained. No further finish is required on the part.

Accuracy of the Rockford Hy-Draulic Shaper ram stroke in maintaining the plane and length of the cut with precision accuracy, makes it the ideal machine for the job. High cutting and return stroke speeds result in fast production and lower costs.

Take a tip from the machine tool builders . . . compare and be critical of the machines you buy. When you do this, your choice in Shapers is bound to be a Rockford Hy-Draulic. Write for complete information and Catalog 1947.

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Because of Hy-Draulic design, Rockford Shapers give you speed, accuracy, and ease of operation in all types of shaper work. These elements combined mean lower costs in production or in tool room or maintenance work. Rockford Hy-Draulic Shapers are built in 12", 16", 20", 24" special, 24" and 28" sizes; Openside Shapers in 36" size.

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PRICE TAGS of QUALITY

Adjustable MULTIPLE DRILL HEADS

Fit any machine, 2 to 10 Spindles.
Save 2 to 10 Operations.

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	6 " "	170.00
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6" DRILLING AREA
¼ capacity
21/32 center

PRICES

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½ capacity in cast iron standard
¾ special adaption in cast iron

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Also manufacturers of all types of fixed center heads

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ACTUAL SIZE OF HOLE THRU SPINDLE

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for Profit

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ACTUAL SIZE OF HOLE THRU SPINDLE

Increase your profit on ordinary lathe work (diameters to 12") by using smaller, faster, handier and extremely accurate SHELDON Precision Lathes. Eliminate excessive tool investment, excessive power consumption. Save floor space. Save your large equipment for really big work.

The SHELDON Lathe, with "Zero Precision" Taper Roller bearings will work to the closest tolerances, will operate efficiently at full capacity and hold its extreme accuracy long after it has paid off its moderate cost.

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Manufacturers of Sheldon Precision Lathes • Milling Machines • Shapers
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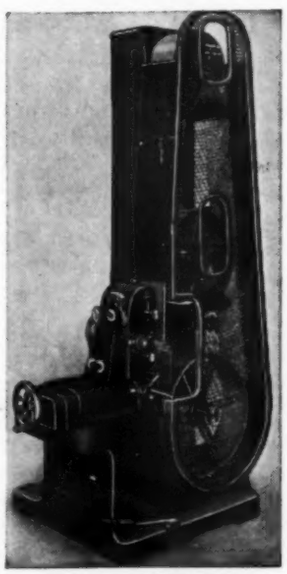

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JUST FEED AUTOMATICALLY

TYPE A "PRODUCTION"
puts high-speed polishing on a truly production basis

The Type A Polishing and Finishing Machine represents "PRODUCTION'S" highest development in machines for polishing and finishing various materials such as metal, fibre, rubber and wood in tubular form up to 6" in dia. All work is handled mechanically at a high rate of production. Automatic holding and feeding devices in conjunction with abrasive belt, give a mechanical finish far superior to that attainable with hand operations.

This machine employs a patent cushion leather belt over which the abrasive belt is run—a construction which provides high points for cutting and low points for chip clearance.

Illustrated literature available on request.

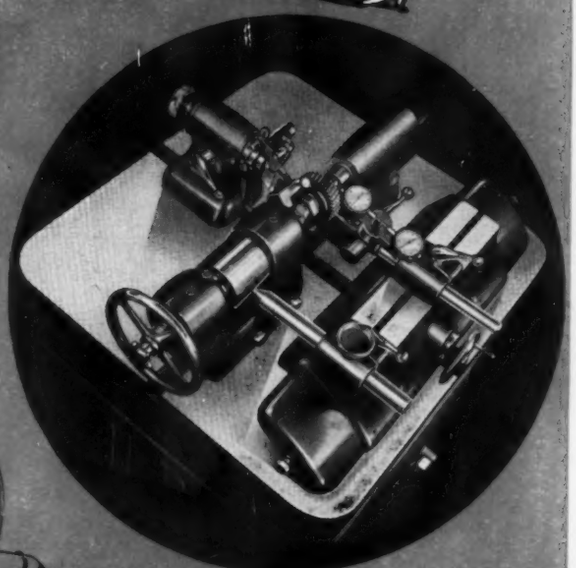
Production MACHINE COMPANY GREENFIELD, MASSACHUSETTS, U.S.A.

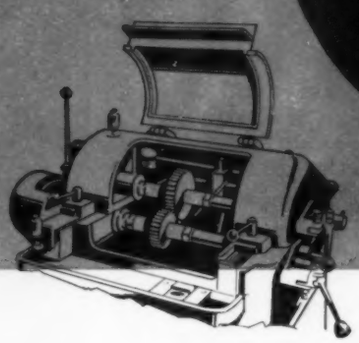
Check For Gear Errors and Test for Gear Noise

The accuracy of the Red Ring Universal Gear Checker classifies it as tool room equipment. At the same time its operation is simple enough for the average machinist to quickly get an accurate check of index, helical angle, eccentricity, lead, tooth size, wobble and tooth parallelism. It will save a lot of scrap when it's available to the operators of production machines.

The Red Ring Gear Sound Tester segregates noisy gear sets before they are assembled, thus saving whatever time is needed to disassemble and reassemble them after being corrected.

The construction of the sound chamber and horn is such that this unit may be successfully used even in a noisy shop. Mating gears are run together under conditions similar to those of actual service.





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SWANK Eliminates Costly Floor Damage by Mounting Punch Presses on UNISORB

Taylor & Fenn Spring Punch Press

No Bolts • No Lag Screws • No Holes in Floors

Swank, Inc., manufacturers of distinctive jewelry and accessories for men, anchors punch presses and other vibrating equipment and machinery on UNISORB.

The hole-drilling and floor damage that go with bolt and lag screw mounting are thus eliminated . . . and another manufacturer's valuable floors protected by UNISORB Mounting.

This modern anchoring method is simple, quick and inexpensive. A special cement binds the UNISORB pads to the machine feet and the floor. Permanent set absolutely prevents any riding.

UNISORB absorbs from 60% to 85% of transmitted vibration and noise. This helps you save on machine repairs and building maintenance, helps you provide employees with quieter surroundings — and helps them work more efficiently.

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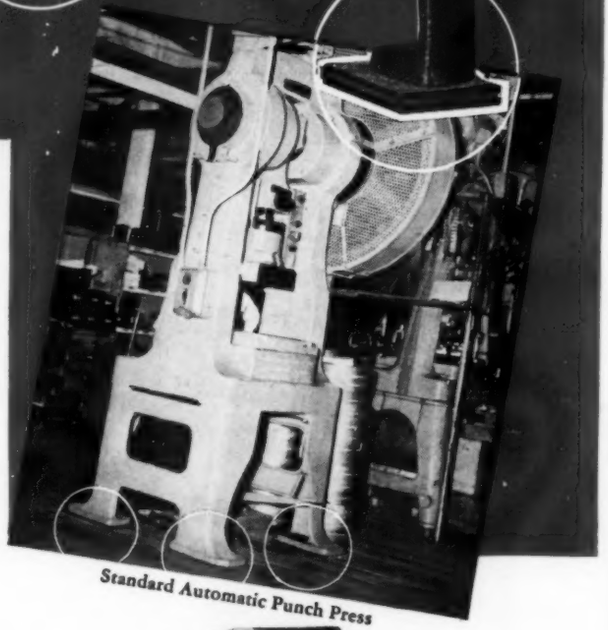

Standard Automatic Punch Press

LOOK FOR THE RED CENTER AND UNISORB BRAND MARK

Writes Swank, Inc.: "We are satisfied users of UNISORB, which we are using for anchoring power presses, automatic stamps, foot presses, exhaust blowers, dryers, tubbing equipment and motors. We have applied UNISORB to wood and cement floors, and also to tile. We do not hesitate to recommend UNISORB for the uses to which we have put it.

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FREE LITERATURE

(Not good after August 1, 1948)

New Catalogs, Booklets, Bulletins

MACHINES AND ATTACHMENTS

1 SPEED LATHES—Schauer Machine Co., Cincinnati, Ohio. 32-page catalog illustrates and describes company's line of speed lathes, designed for secondary-finishing operations on small metal and plastic parts. Included are lathes for polishing lapping, filing, and deburring.

2 PRESSES—Greenerd Arbor Press Co., Nashua, N. H. 20-page catalog 40 covers hydraulic and hand-operated arbor presses. Also offered is 4-page folder 112 covering with specifications company's hydraulic presses.

3 DRILLERS, TAPPERS—The National Automatic Tool Co., Richmond, Ind. 20-page bulletin. completely indexed, covers heavy-duty and standard NATCO H-5 and H-6 machines for high-speed, multi-hole production of small parts in steel, cast iron, plastic, wood, and aluminum.

4 BENDING MACHINE — Wallace Supplies Mfg. Co., Chicago 14, Ill. 8-page pamphlet 34 covers company's new portable, hydraulic, ram-type bending machine, No. 1402. Machine eliminates repositioning of dies and relocating of pipe when bending to 180° in one continuous operation.

5 MILLING MACHINES—Van Norman Co., Springfield 7, Mass. 6-page folder illustrates and describes the ram-type milling machines. Featured are Models 22L and 22M, plain and universal.

6 BAND SAW—Kalamazoo and Silo Co., Machine Tool Div., Kalamazoo, Mich. 4-page folder gives features and specifications on the Kalamazoo metal-cutting band saw. A standard model and a coolant model are featured.

7 ROLL GRINDER—Farrel-Birmingham Co., Inc., Ansonia, Conn. 28-page bulletin 115 contains design and construction features of the heavy-duty roll grinder for precision production in heavy roughing or fine finishing.

8 SHEET-METAL MACHINES—Wysong and Miles Co., Greensboro, N. C. 6-page folder illustrates and describes the various models of sheet-metal machines offered. Featured are multiple-disk clutch, parallel back gage, and a non-repeat unit to prevent spoiling materials.

9 HYDRAULIC PRESSES—Verson Allsteel Press Co., Chicago 19, Ill. 12-page bulletin gives specifications on press capacities from 75 to 5000 tons. Also described is the Hydrol speed circuit, a hydraulic system for minimizing high-pressure piping and valving.

10 PLANERS—Liberty Planers, Hamilton, Ohio. 20-page bulletin 157 fully illustrates and gives specifications on company's line of planers. Featured are motorized automatic rail clamping and dual control (either side of machine) for rapid traverse, elevation, and clamping.

11 COST HISTORIES FOLDER—New Britain-Gridley Machine Div., The New Britain Machine Co., New Britain, Conn. 10 single pages contained in a folder give actual cases of manufacturers having made a better product for less money by better tooling methods. Studies include multiple-spindle chucking and screw machines and precision-boring machines.

TOOLS AND ACCESSORIES

12 TWIST DRILLS—Cogsdill Twist Drill Co., Detroit, Mich. 140-page spirally bound and indexed catalog covers company's line of drills, reamers, counterbores, end mills and cutters, and other tools. Specifications and prices are included.

13 GAGES—Size Control Co., Chicago 12, Ill. 20-page bulletin 48 gives information on features offered, including thread gages with an aluminum center and a steel outer ring for the gaging surface. Line includes reversible Go and No Go plug and thread gages, snap and ring gages, and others.

14 GAGE BLOCKS—The Webber Gage Co., Cleveland 11, Ohio. 8-page bulletin entitled, "Precise Measurement Is the Critical Factor in Quality Control," contains information on company's micro-accurate gage blocks.

15 RADIUS DRESSER—Perfex Gage and Tool Co., Mt. Clemens, Mich. 4-page folder presents various features of the radius dresser with micromatic setting. Radii smaller than 0.050 to a full half circle can be dressed.

HEAT-TREATING AND WELDING

16 FIRE BRICK, REFRACTORY CEMENTS—Armstrong Cork Co., Lancaster, Pa. 24-page bulletin gives information with specifications on Armstrong's insulating fire brick and refractory cements.

17 COMBUSTION SAFEGUARD—Wheelco Instruments Co., Chicago 7, Ill. 12-page pamphlet illustrates and describes the improved Flame-otrol, a combustion safeguard for gas- and oil-fired furnaces, ovens, boilers, and other heating equipment.

18 ELECTRODES — Air Reduction Sales Co., New York 17, N. Y. 36-page booklet, called, "Pocket Guide to Airco Electrodes," includes description, recommended application, and welding procedure on each electrode. The indexed guide includes sections titled mild steel, high-tensile steels, low-hydrogen weld metal, and others.

19 RESISTANCE WELDING—Sciaky Bros., Inc., Chicago, Ill. 8-page bulletin 136-A illustrates and describes three-phase balanced-load resistance welding at near-unity power factor.

Example

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PLANT SERVICE EQUIPMENT

20 COUNTING ELECTRICALLY AND PHOTO-ELECTRICALLY—Production Instrument Co., Chicago 6, Ill. 16-page bulletin ES-91 illustrates and explains the applications of electric and electric-eye counting.

21 INVENTORY CONTROL — Remington Rand Inc., New York 10, N. Y. 24-page booklet illustrates and describes methods of simplifying management of stocks to prevent losses either from too much or too little.

22 INDUSTRIAL AIR EQUIPMENT —Air-Trol, Chicago 12, Ill. 12-page bulletin 47A illustrates and gives specifications on air arbor presses featuring full adjustment, and on company's line of equipment.

23 PORTABLE POWER TOOLS—Mall Tool Co., Chicago 19, Ill. 36-page bulletin 582 serves as a general catalog of company's line of equipment. Grinders, drills, saws, and other equipment are included.

24 GEARED MOTORS—U. S. Electrical Motors, Inc., Los Angeles 54, Calif. 16-page bulletin presents latest models of Syncrogears in single, double, and triple reductions for use in combination with Varidrive units. Hardened gears and pinions for wear resistance are featured.

25 TRAILERS, LIFT TRUCKS—The Mercury Mfg. Co., Chicago 9, Ill. 50-page bulletin 7-11, spirally bound, contains information on tractors and trailers, accessories, fork-truck systems for material handling, platform lift-truck systems of materials handling, load-carrying trucks, and power source, including charging equipment.

26 TRANSFORMERS — Westinghouse Electric Corp., Pittsburgh 30, Pa. 12-page bulletin B-4009 illustrates and describes company's line of dry-type transformers for operation of motors, lights, and other equipment requiring 120-240 v.

27 BLOWER WHEELS, CONTRACT METAL STAMPINGS—Morrison Products, Inc., Cleveland, Ohio. 20-page bulletin commemorates company's 25th anniversary. Included is information on blower wheels, contract metal stampings and drawn-steel wheel guards.

28 HANDLING MATERIALS—Towmotor Corp., Cleveland, Ohio. Bulletin, featuring a new format as of 1948, is published quarterly. Bulletin covers fork-lift trucks, industrial tractors, and fork-lift-truck accessories.

PARTS AND MATERIALS

29 CYLINDERS—Lindberg Engineering Co., Chicago 12, Ill. 12-page bulletin 700 illustrates and describes oil hydraulic cylinders, cushioned and non-cushioned. Units are available in 10 standard-bore sizes from 2 to 8 in.

30 X-WASHERS—Standard Locknut & Lockwasher, Inc., Indianapolis 4, Ind. 6-page folder illustrates with drawings and gives specifications on standard X-washers, and X-washer pins. Washers feature 360° closure, and are available for pin diameters from 7/32 to 17/32 in.

31 BALL-BEARING MOUNTING—New Departure, Div., General Motors Corp., Bristol, Conn. 20-page booklet AP gives the principal steps required in developing a successful ball-bearing mounting.

32 AIR CONTROLS—Bendix-Westinghouse Automotive Air Brake Co., Elyria, Ohio. 21-page folder illustrates and describes the Robotair industrial air controls.

33 AUTO-TRUER—Chas. E. Chapin Co., Inc., East Rutherford, N. J. 4-page folder describes the Auto-Truer designed to give true concentricity as low as 0.0001 in. on chuck or face-plate work. Device is adaptable to any lathe with spindle threads up to 2¼ in.

34 A VISIT TO LUKENS—Lukens Steel Co., Coatesville, Pa. 26-page booklet illustrates and describes the various company departments. Included are an open-hearth department, the 120-in. mill, plate mill, grinding and trimming and others.

35 GRINDING FACTS—The Carborundum Co., Niagara Falls, N. Y. 136-page booklet illustrates and describes principles of grinding for help in selection, identification, specification, application and care of grinding wheels.

36 WORMS, LEAD SCREWS—Jerpbak Bayless Co., Chagrin Falls, Ohio. 4-page folder illustrates and describes precision-ground worms, lead screws thread-ground products, wheel crushing, and rolls.

37 PLASTICS — Monsanto Chemical Co., Plastics Div., Springfield 2, Mass. 20-page bulletin gives fabricating methods and general properties of various materials. Information on Resinox, Resimene, and other plastics is included.

38 AIR-CONTROL VALVES—Airmatic Valve, Inc., Cleveland 3, Ohio. 22-page bulletin 48 illustrates and describes various types of valves, including 3- and 4-way hand- and foot-controlled valves, and solenoid valves.

39 ALUMINUM SHEET, PLATE—Reynolds Metals Co., Louisville 1, Ky. 48-page booklet gives technical information relative to various sheet and plate alloys, gages and sizes.

40 TUBE FITTINGS—Flodar Corp., Cleveland 15, Ohio. 12-page pamphlet contains information on design, construction and performance of Flodar fittings on high fluid-pressure installations.

41 KODAGRAPH PAPERS—Eastman Kodak Co., Rochester 4, N. Y. 8-page bulletin describes the Kodagraph projection papers for use with enlargers, projection printers, or process cameras.

42 GRINDING WITH OIL—D. A. Stuart Oil Co., Chicago 23, Ill. 20-page booklet gives information on selection of oil, as well as wheels. Wheel-marking systems are also discussed.

43 JOINTS—Curtis Universal Joint Co., Inc., Springfield, Mass. 4-page folder illustrates and describes the Curtis standard and Curtis ball-type joint. Specifications are included.

44 CHROMIUM PLATING—Chromium Corp. of America, New York 5, N. Y. 36-page catalog provides information for applications of industrial chromium plating. Characteristics, tables and charts are included.

45 OPEN-STEEL GRATING—Wm. F. Klemp Co., Chicago 38, Ill. 24-page booklet 44 illustrates and describes open-steel flooring, both riveted and welded types. Also discussed are stair treads and structural footwalks.

46 STUD-WELDING GUN — Nelson Sales Corp., Lorain, Ohio. 4-page house organ, Vol. 1, No. 1, issued bimonthly, describes a method of fastening, using the Nelson stud-welding gun which end-welds various stud-like fasteners to steel framing.

47 GALVANIC CORROSION — International Nickel Co., New York 5, N. Y. 10-page pamphlet discusses various aspects of galvanic corrosion. Pamphlet covers factors influencing corrosion and also presents data on minimizing galvanic effects.

48 PLYMETL—Haskelite Mfg. Corp., Grand Rapids 2, Mich. 20-page booklet, spirally bound, describes Plymetl, a metal-clad plywood, said to possess great strength and stiffness. Comparisons are made with steel and aluminum.

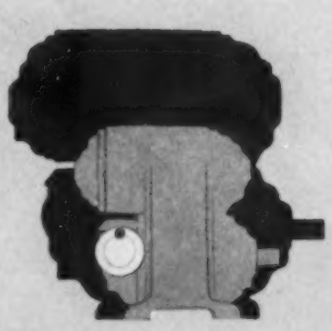
MISCELLANEOUS

49 YOUR PRODUCTION PROBLEMS—The Emerson Engineers, New York 20, N. Y. 22-page bulletin is divided in three sections: the three basic factors you manage, several case histories of production problems, and particular comments on competent counsel.

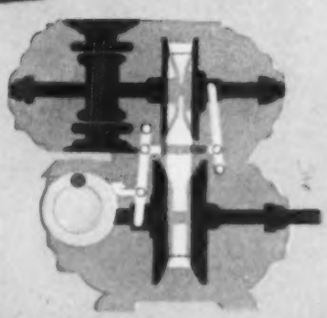
NOW... VARIABLE SPEED... AT ITS BEST!

IMPROVED
STERLING SPEED-TROL
...PERFECT "SPEED CONTROL" IN ONE COMPACT POWER UNIT

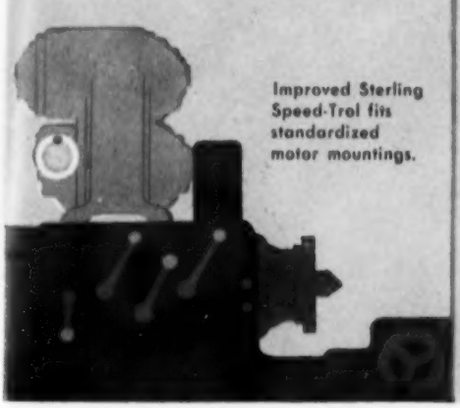
Fingertip speed control provides flexible, positive power at the correct speed — faster or slower. Thousands of satisfied users are getting maximum production efficiency under variable conditions with Sterling Speed-Trols.



Improved Sterling Speed-Trol occupies one-half the space formerly required.



Improved Sterling Speed-Trol is the simplest speed control power unit you can buy — accepted V-Belt principle.



Improved Sterling Speed-Trol fits standardized motor mountings.

★

The improved Sterling Speed-Trol is rugged, sturdy, and of balanced design for every horsepower rating. Motor and speed control in one compact, integral unit. Generous capacity — liberal ball bearings — experienced engineering insure long, dependable service. Available in a wide range of speed combinations.

★

Use the improved Sterling Slo-Speed geared motor — where one best constant slow speed is required.

Where constant normal speed is required, use the improved Sterling KLOSD; KLOSD-TITE FAN-COOLED; KLOSD-TITE ENCLOSED; KLOSD FACE-MOUNTED electric power drives.

STERLING ELECTRIC MOTORS

GENERAL OFFICES: LOS ANGELES 22, CALIFORNIA

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Canadian Sterling Electric, Ltd., Hamilton, Ontario, Canada

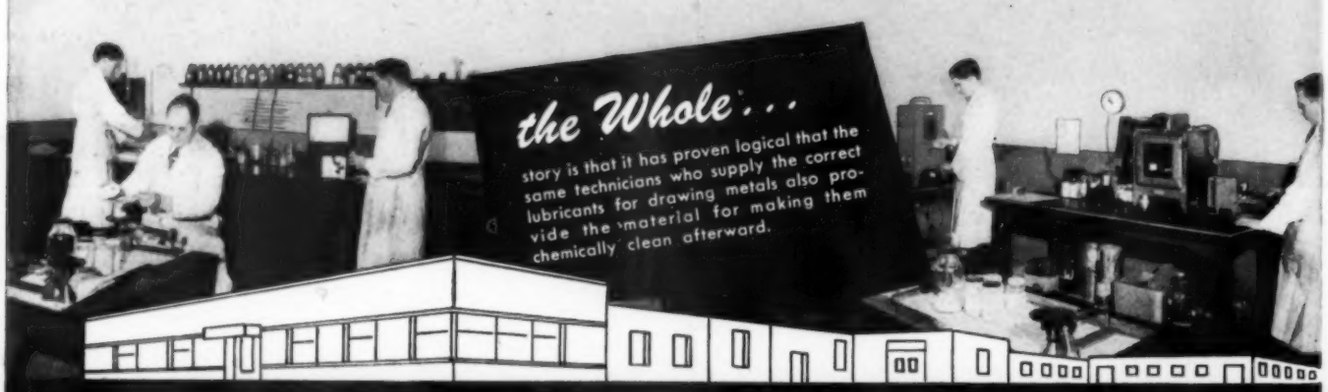
Representatives in Principal Cities and Foreign Countries

Half of this message has to do with NORTHWEST products and processes for chemically cleaning ferrous and non-ferrous metals preparatory to plating, vitreous enameling, painting, etc., each problem involving a specific programing of one or more of the thirty-five standard NORTHWEST Cleaning Compounds including Electrolytic, Immersion, Solvent, Spray, and Water Wash types . . . the "Lo-Hi" pH process of chemically cleaning metals, preparatory to plating, porcelain enameling, etc., makes practical a control that management can plan on in these departments regardless of the type of metal or soil.

HALF
pH control

the other
HALF
SUPER-DRAW

is concerned with metal forming lubricants developed for ferrous and non-ferrous metals in both pigmented and non-pigmented form . . . SUPER-DRAW products are specifically compounded for: 1. Brass and Brass Alloys, 2. Cold Rolled Steel, Enameling Iron, Stainless Steel and Aluminum, 3. Alloys of Steel, Aluminum and Copper . . . SUPERDRAW compounds will handle light, medium, and heavy operations . . . may be applied by brush, roller, spray, or dipping . . . A request on your letterhead will bring a technician to consult you on your drawing and cleaning problems . . .


the Whole . . .
story is that it has proven logical that the same technicians who supply the correct lubricants for drawing metals also provide the material for making them chemically clean afterward.

LO HI pH

NORTHWEST CHEMICAL CO.
9310 ROSELAWN AVE. DETROIT 4, MICH.

pioneers in pH cleaning control—serving you since '32

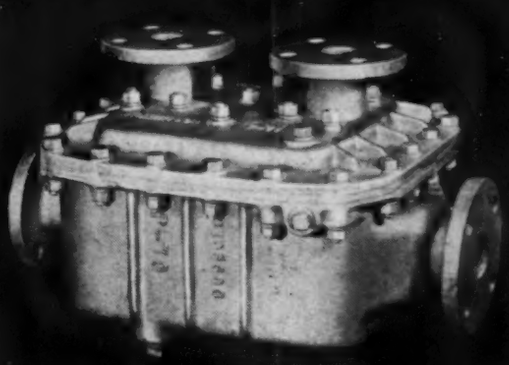
CAN waste BRING EFFICIENCY?

YES, you can waste heat and save production time

How can a device that *wastes* something be of interest to production men? Here's the answer. Harrison Oil Coolers waste heat—destructive heat—that would otherwise cause mechanical trouble, limit operating speeds, shorten machine life.

Compact, durable Harrison Oil Coolers can save production time in your plant. Consult Harrison.

HARRISON



HARRISON OIL COOLERS FOR INDUSTRIAL APPLICATIONS

HARRISON RADIATOR DIVISION OF GENERAL MOTORS CORPORATION, LOCKPORT, N. Y.

BUZZER INDUSTRIAL Gas EQUIPMENT

*Reg U.S. Pat. Off.

No Blower or Power is needed to reach High Temperatures with a "BUZZER" Gas Furnace . . . just connect to your gas supply.

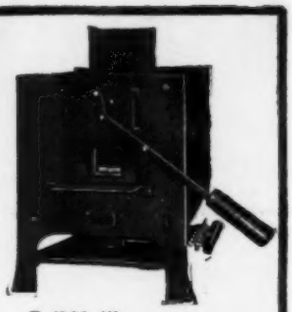
Rectangular Heat Baths

For liquid heat treating baths, soft metal melting, etc.

The High Speed Full Muffle Furnace attains a temperature of 2400° F., and is designed for High Carbon and Alloy Steels.

BUZZER Rectangular Heat Baths meet the increasing demands for large liquid Heat Bath Furnaces, and are built in many sizes. Also made in round type pot furnaces

Send for the new BUZZER Catalog showing full line of Gas Furnaces, Burners and other equipment.



Full Muffle Furnace (Bench Type)

CHARLES A. HONES, INC.

121 South Grand Avenue Baldwin, L. I., N. Y.

LINLEY

for NOISELESS, HIGH SPEED RIVETING

Rotary spinning principle shapes uniform heads, silently . . . capacities up to ⅜ inch diameters. Adjustable spindle stroke, controlled pressure . . . double row radial thrust bearing supports spindle, assures long life. Table elevating screw prevents slipping. Six floor or space-saving bench models . . . sturdily built for trouble-free operation under severe production schedules.

FOR COMPLETE INFORMATION, WRITE FOR BULLETIN.

LINLEY BROTHERS CO., 664 STATE ST. EXTENSION BRIDGEPORT 1, CONNECTICUT

"This multiple drill head has increased our torch cone end production by about 600%."

Drilling 6 holes 1⅞" deep— No. 45 Drill, 28 strokes in 1 min. 10 sec.

When this MULTI-DRILL went into operation with a seven-station full automatic step drilling machine, welding torch cone end production at the Victor Equipment Co., manufacturers of gas welding and flame cutting equipment, went up "about 600%."

Why not see how your production can be increased with a MULTI-DRILL—the production drilling head designed for accurate high speed drilling? Available with 2 to 8 spindles; quickly and easily adjusted to any hole pattern on or within a 9" circle; ½" min. center distances. Drill sizes 1/32" to ⅜". *Special adaptations available*

Write for details and name of your nearest Distributor

COMMANDER MFG. CO.

4229 W. Kinzie Street • Chicago 24

Product of *Commander* — Builder of the *Commander Tapper*

WALTHAM SUB-PRESSES...

...for precision work

Arch Sub-Press

The cylindrical plungers in the Waltham Sub-presses slide in babbitted bearings. This bearing is tapered on the outside and can be forced downwards, thus reducing the inside diameter to fit the plunger when the latter becomes worn through use. Exact alignment and constant precision can be maintained throughout the life of the die. Write for information about the nine sizes.

Overhang Sub-Press

WALTHAM MACHINE WORKS

HIGH STREET, WALTHAM, MASS.

FINGER-TIP CONTROL for POWER BOATS

with Hydraulic Engineering by Electrol

The Electrol 4-Way Solenoid-Operated, Open Center Valve.

In developing simplified controls for precision-built power boats, engineers of Columbian Bronze Corporation presented this problem to Electrol technicians: to produce a compact, 4-Way Solenoid-Operated, Open Center Valve for use in the hydraulic control systems of pleasure and commercial vessels.

The Electrol Valve, shown above, met every specified requirement. It is compact in design, corrosion resistant, withstands constant vibration, lowers power consumption and operates with pressures up to 1,500 p. s. i.

Because of the open center feature of the Electrol Valve, the pump is required to deliver pressure only when the valve is in operation—leaving the fluid free to circulate at other times.

Electrol engineers, co-operating with technical staffs in many lines of industry, agriculture and transportation, have found the right answers to many baffling hydraulic problems. They are ready to put their experience and skill at your disposal.

• • •

Electrol

INCORPORATED

KINGSTON, NEW YORK

CYLINDERS • SELECTOR VALVES • FOLLOW-UP VALVES
CHECK VALVES • RELIEF VALVES • HAND PUMPS
POWERPAKS • LANDING GEAR OLEOS • SOLENOID
VALVES • ON-OFF VALVES • SERVO CYLINDERS • TRANSFER
VALVES • CUT-OUT VALVES • SPEED CONTROL VALVES

FOR BETTER HYDRAULIC DEVICES

HARTFORD SUPER-SPACER
Special

for JIG BORING WORK...

Here the Super-Spacer is demonstrating another of its advantages to any tool room. Equipped with a face plate for exact location of work, it can be used on your jig borer to save indexing time, *and* production cost per piece. The Super-Spacer takes milling, drilling, grinding, planing, slotting, boring and other operations in stride. Investigate its benefits to your shop. *Write Dept. S2.*

SPECIAL MACHINES BUILT TO ORDER

We have specialized in building machines and parts to our customers' drawings for 36 years. Send your blueprints for prompt estimates.

HARTFORD *Special*

THE HARTFORD SPECIAL MACHINERY CO.
HARTFORD 5, CONN.

Grand Rapids No. 55 Surface Grinder

Faster precision production is possible with the exceptional table speed of Grand Rapids Hydraulic Feed Surface Grinders. Both longitudinal table travel and cross feed are automatic, hydraulic. Wheel head is powered for rapid vertical travel.

Write for Bulletin GL-101

GALLMEYER & LIVINGSTON COMPANY
Manufacturers of Grand Rapids Grinders
330 STRAIGHT ST., S. W., GRAND RAPIDS 4, MICH.

LELAND GIFFORD

PRODUCTION ENGINEERS
at these Branch Offices will help you with your
DRILLING PROBLEMS.

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Cut Turning Time in ½

with Nicholson
EXPANDING MANDRELS

Time studies show that with these widely used precision tools, operations can frequently be completed in less time than was formerly consumed in locating or turning a solid arbor. Sold singly or in sets; for bores ½" to 7". Bulletin 1043.

W. H. NICHOLSON & CO., 114 Oregon St., Wilkes-Barre, Pa.

SOLDERLESS TERMINALS by the mile!

"... To apply electrical terminals on wire *faster, cheaper* and *better* than any other method ..." That was the motivating idea in the development of the AMP Automatic Wire Terminator by Aircraft-Marine Products Inc., of Harrisburg, Pa.

Terminals can be applied with equal facility to solid or stranded, bare or insulated wire in a wide variety of wire sizes and tongue shapes. Even with unskilled help, performance records indicate that production of identical, electrically perfect connections can be made at a rate up to 3200 an hour.

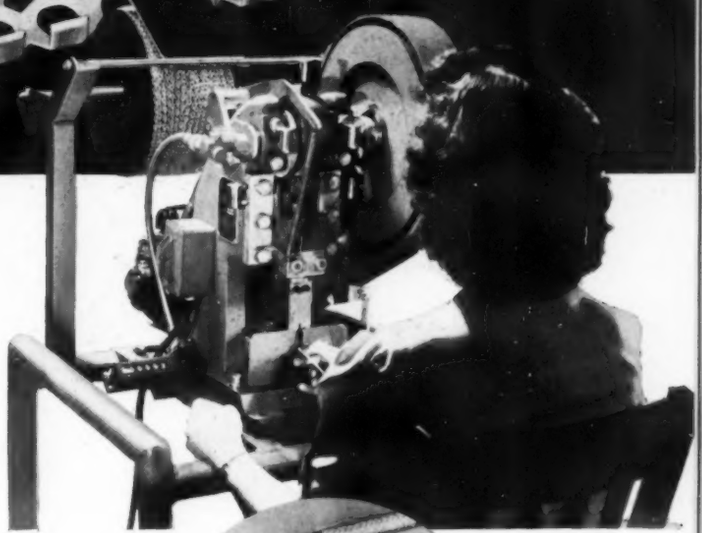
But to accomplish this high speed, cost saving method, the solderless brass and copper terminals had to be produced in long continuous lengths and then fed to the "Terminators" on conveniently handled spools.

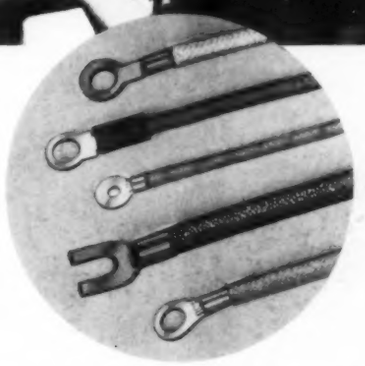
The American Brass Company supplies Anaconda Copper and Brass in coiled strip, in a variety of widths and gages. Composition and temper must be consistently uniform to meet the requirements for the rapid blanking and press forming operations—and the completely automatic crimping cycle. 48113

THE AMERICAN BRASS COMPANY
***General Offices:* Waterbury 88, Connecticut**

ANACONDA
from mine to consumer

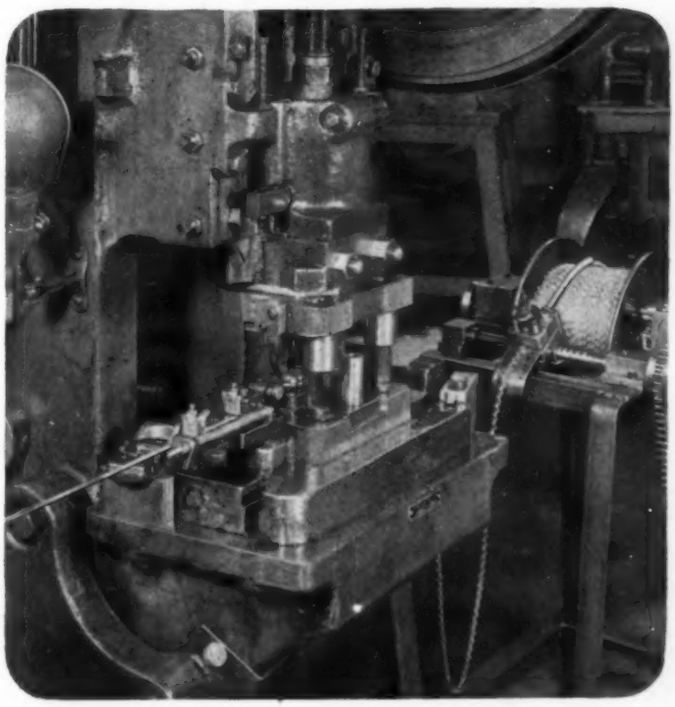
Anaconda
COPPER and BRASS





Above: The AMP Automatic Wire Terminator and some typical examples of its work.

Below: Anaconda Brass being stamped and formed into a continuous strip of solderless terminals.

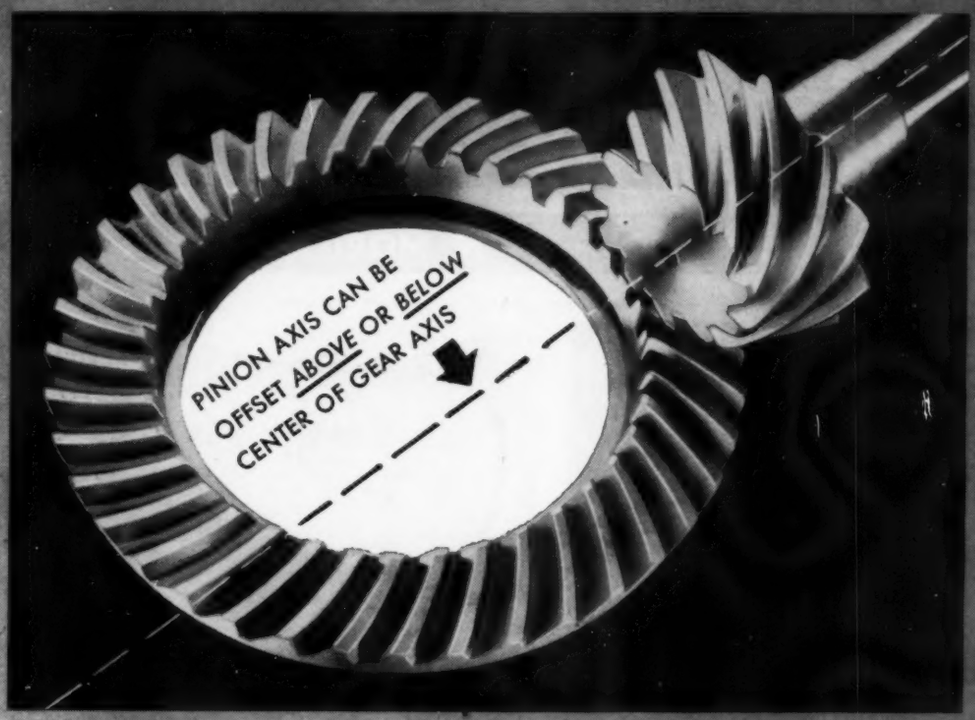


ANACONDA
from mine to consumer
REG. U.S. PAT. OFF.

10 manufacturing plants **5** warehouses
27 district offices . . . **PLUS** a network
of distributors throughout the nation

THE AMERICAN BRASS COMPANY • *General Offices:* Waterbury 88, Connecticut
Subsidiary of Anaconda Copper Mining Company
In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

"HYPOID" GEARS *ARE STRONGER*



. . . and run very quietly and smoothly

Hypoid gears are similar to spiral-bevel gears, but have the pinion axis offset above or below the center of the gear axis.

The gear and pinion shafts of a Hypoid pair can continue past each other. This direct and compact arrangement is used to advantage in steel mill, paper mill, printing press, and many other industrial applications. Other advantages are that there is more room to place bearings on both sides of the gear and pinion, and that in some cases the lowered or raised position of the pinion allows arrangement of machinery which would not otherwise be possible.

The teeth of Hypoid Gears are similar to spiral-bevel gears, in that they are oblique and curved. They engage gradually from one end to the other, and have *continuous contact* at the pitch line—and there are always at least two pairs of teeth in contact.

Send for the "Gear Book" which contains 68 pages of highly useful information; in fact, it's almost a "treatise on gears".

Please use your Business Letterhead when writing for this Catalog.

Philadelphia
GEAR WORKS INCORPORATED
ERIE AVE. AND G ST., PHILADELPHIA 34, PA.
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Industrial Gears and Speed Reducers
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GANSCHOW CUT GEARS

SPUR—SPIRAL
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AND PINION

MEMBER OF AGMA

UP TO 60" PITCH DIA.
UP TO 10" FACE WIDTH

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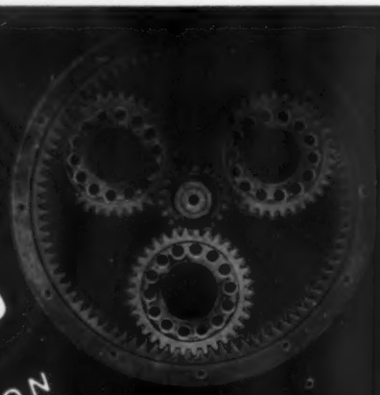
GEARS
OF EVERY DESCRIPTION



This planetary gear train is an example of the precision gear work which we handle to our customers' prints and specifications

Write Dept. G 12

HARTFORD Special

THE HARTFORD SPECIAL MACHINERY CO.
HARTFORD 5, CONN.

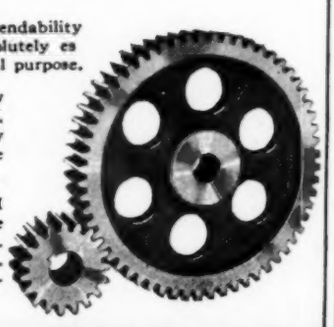
YOU CAN'T MISS *with* Cincinnati Gears!

- ★ SPUR
- ★ BEVEL
- ★ HELICAL
- ★ SPLINE
- ★ WORM
- ★ SPECIAL

Maximum performance and dependability are two qualities that are absolutely essential in gears for any industrial purpose.

Hundreds of users know how faithfully CINCINNATI *Gears, Good Gears Only*, consistently give outstanding performance wherever they are used.

Industry selects CINCINNATI Gears with complete confidence in their ability to do a good job. Specify CINCINNATI Gears.... for continuous, faithful performance.



THE CINCINNATI GEAR COMPANY
"Gears Good Gears Only"
Wooster Pike and Mariemont Ave. • Cincinnati 27, Ohio

GEAR CUTTING MACHINES
Well Designed
Good Features
Create Production Advantages
43 Years' Experience
NEWARK GEAR CUTTING MACHINE CO.
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FRANK E. EBERHARDT, *President*

QUALITY GEARS
CUT TO ORDER

• MEISEL produces but one *kind* of gears . . . gears constructed for specific jobs. Only through the inherent accuracy of this special designing could such dependability, performance and economy be possible. Tell us what you expect it to do, and we'll show you the one gear suited for your job.

MEISEL PRESS MFG. CO.
946 Dorchester Avenue Boston, Mass.

Why Morton's Salt Tablets to fight "heat fatigue"?

For years, industrial physicians and safety engineers have recommended salt tablets as low-cost insurance against the loss of efficiency and man-hours that "heat fatigue" causes. But it is vitally important that workers **accept** the salt tablets you provide them—are sure they are pure, reliable, safe.

Workers know Morton's Salt

Undoubtedly most of your employees use Morton's Table Salt in their homes. They know it is dependable and pure. So they accept Morton's Salt Tablets. They know they are a wholesome health aid backed by a familiar name.

Cost less than 1¢ a man per week

Morton's Heat Relief Salt Tablets—the best that money can buy—cost so little. Can you afford to be without "heat fatigue" protection in your plant? Order Morton's Salt Tablets and Dispensers from your distributor, or directly from this advertisement. Write for free folder. MORTON SALT COMPANY, 120 So. La Salle St., Chicago 3, Ill.

"Heat Fatigue" costs money!

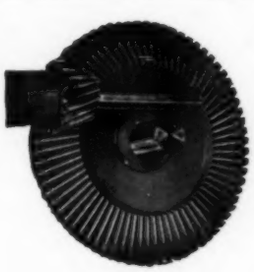
Sweating robs the body of salt. This causes weariness—inability to work efficiently—and eventually, heat-cramps and prostration. "Heat fatigue" cuts down productivity, steps up absenteeism.

Morton's Salt Tablets act **fast** to replace lost body-salt—help keep production and efficiency at high levels. They're pleasant, easy to take, inexpensive.

Modern Plastic Dispenser. Practical, accurate, large size. 1000 tablet capacity.....$3.25

Heavy Duty Dispenser. Strong metal for rough treatment. Accurate. 500 tablet capacity.....$4.00

Morton's Salt Tablets Case of 6000, 10-grain, plain salt tablets....$2.10
Case of 6000 8-grain Salt Dextrose Tablets . $2.60

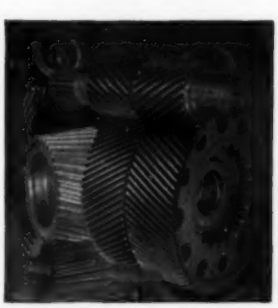


BILGRAM QUALITY GEAR

BILGRAM TRADE MARK

ALL TYPES • ALL MATERIALS
BILGRAM GEAR & MACHINE WORKS
1217 Spring Garden, Philadelphia, Pa.

PROMPT DELIVERIES



"The Capitol" **GEARS**

Dependable gears made to exacting requirements quickly. All types. Any material. Fast shipments.

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- Bevel Gears
- Mitre Gears
- Helical Gears
- Internal Gears
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Open capacity on Sykes Generators
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ACCURACY

Efficiency

Economy

These three factors are the key-note of our special tools and machinery. Columbus Die-Tool builds and designs the tool for your particular purpose and will solve the toughest tooling problems effectively and promptly. Do not hesitate to consult our endless experience in this field.

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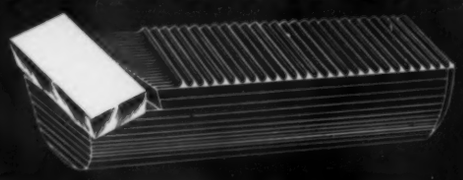
ANNOUNCING



NEW No. 50-18 BLADES

The "New Look" for Type "A" Lovejoy Mills

Here is a new T.C.T. negative rake blade that will make your oldest Lovejoy milling cutter housings as modern as tomorrow. Yes, it has the same shank size as every Type "A" blade ever made — whether T.C.T., cast alloy or H.S.S. The tip is set so that it really shears steel and cast iron and tosses the chips out. It requires less horsepower than most common blades—it produces cuts with fine finish.

Compare THESE RESULTS

A recent test with *NEW #50–18 blades* in a *20-year old Lovejoy Type "A" housing* gave the following results — MATERIAL: 3140 — OPERATION: face 2" wide x 12" long — SPEED: 365 R.P.M. (490 S.F.P.M.)—FEED: 60" per minute—CHIP LOAD: .014"—DEPTH: ¼"—FINISH: good. After 5½ hours cutting time the blades did not require sharpening.

Lovejoy has blade and cutter styles for all types of milling. For full details write for Catalog No. 28.

"TOOL BITS"

Lovejoy has prepared a data sheet covering all blades for Lovejoy Type "L", "A" and "H" face mills. It has, in convenient form, all necessary information for reordering these blades. Also there are all the data on rake, bevel and working angles, both radial and axial needed for proper resharpening of the blades. In addition, the data sheet graphically illustrates the economies afforded by standard Lovejoy blades because they are interchangeable in a wide size range of Lovejoy cutters. The sheet is yours for the asking — send for it today.

Lovejoy
TOOL COMPANY, INC.
SPRINGFIELD, VERMONT

WANT LONGER TOOL LIFE
. . . LESS DOWN TIME?
IT'S BEING DONE
WITH **LUSOL**
THE TOOL SAVING FLUID
SUCCESSOR TO
ORDINARY CUTTING OIL
AND SOLUBLES

THE NEW DAY COOLANT THAT SPEAKS FOR ITSELF

The word is spreading . .
a trial will convince you

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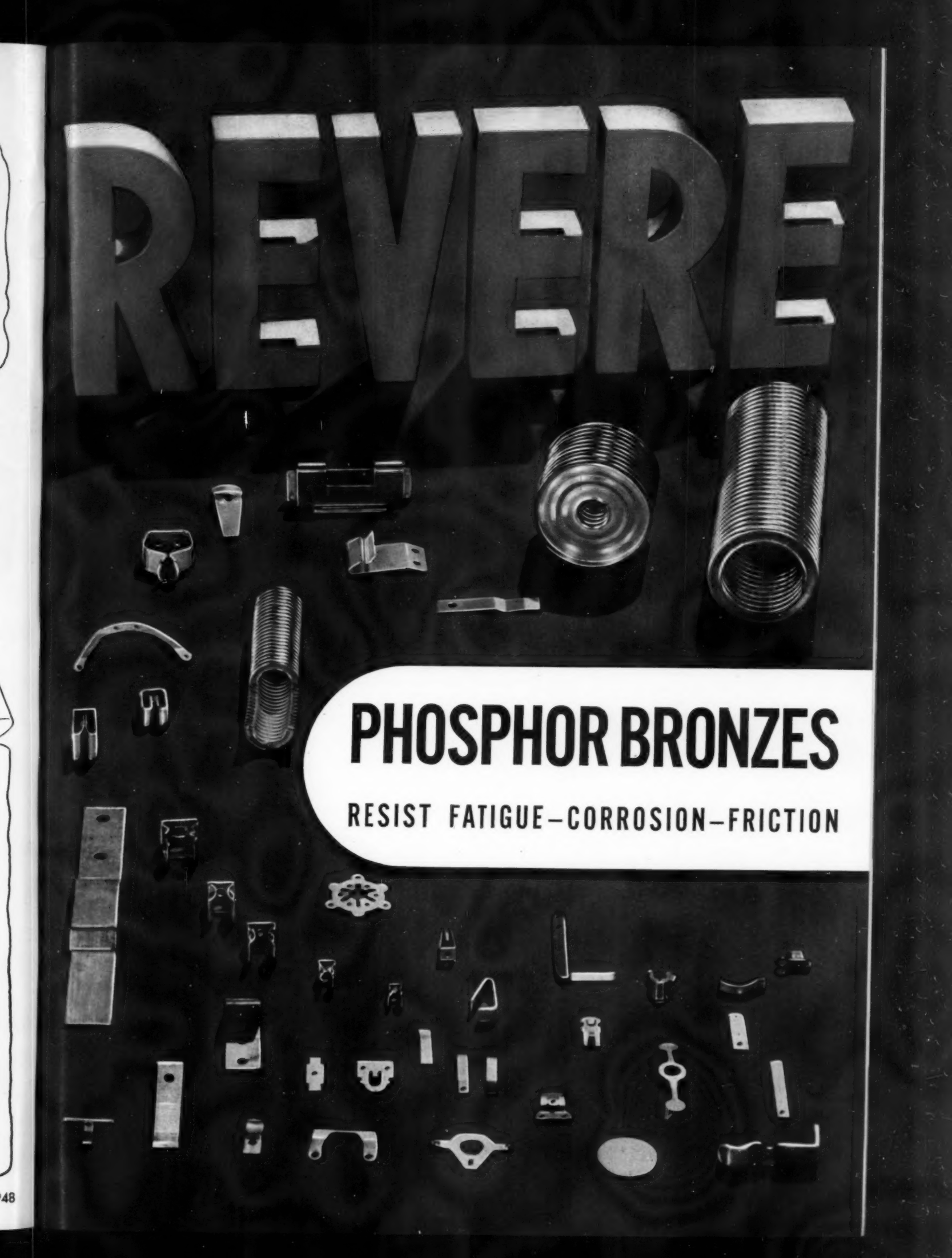

REVERE
PHOSPHOR BRONZES
RESIST FATIGUE–CORROSION–FRICTION

Spring Qualities. In many cases it is the "springiness" of Revere Phosphor Bronzes that makes them so popular. These remarkable metals have an extreme resistance to fatigue. Parts will retain their dimensions, elasticity, and contact pressures through many millions of spring actions. Phosphor Bronze, 8%(C), for example, should stand over 100 million reversals of stress at 25,000 psi. See chart.

UNIQUE ADVANTAGES OF REVERE PHOSPHOR BRONZES

Such high fatigue resistance has an important bearing upon economy. It should be remembered that in many spring applications the cost of the spring itself is small compared with that of the part for which it is essential. The long life of phosphor bronze assures long-run economy.

High Strength. Tensile strengths up to 133,000 psi. are obtainable, and yield strengths of 70,000 psi. or higher.

Resists Corrosion. Revere Phosphor Bronzes are comparable to copper and copper-silicon alloys in corrosion-resistance. They are highly resistant to a great variety of corrosive conditions and chemicals, and are practically immune to season cracking or stress corrosion.

Electrical. Depending upon the grade, phosphor bronzes have electrical conductivities from 11 to 43% I.A.C.S., at 20°C. They are largely employed in switches and contacts requiring heavy pressures, and are much less affected by arcing than are alloys containing zinc. They are non-magnetic.

Easy Workability. Phosphor bronzes are easily fabricated by the usual processes of punching, stamping, drawing, machining, and so on. In the fully annealed state they are extremely ductile.

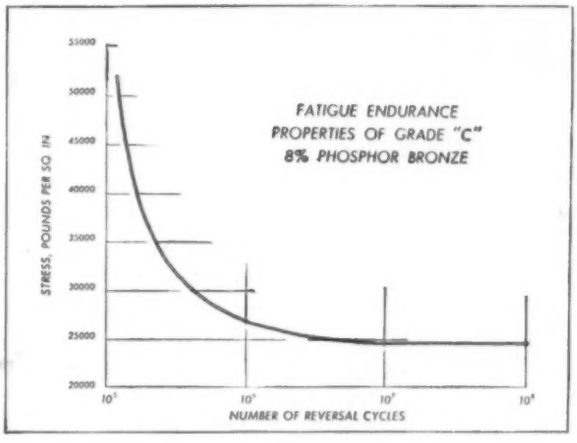
Four Grades. 5%(A), 8%(C), 10%(D) and E (under 4%) phosphor bronzes offer a variety of characteristics, enabling selection of the correct material for various uses. In general, they are used for springs, diaphragms, bellows, fuse clips, lock washers, clutch discs, and similar applications requiring high fatigue resistance. Phosphor bronze is also particularly suitable to withstand severe compression, wear and corrosion. Grades A and D are also used in welding rod.

True Bronze. Revere Phosphor Bronzes are true tin bronzes, containing from 1¼% to 10% tin. The phosphorous content is a mere trace, not over .05%. Phosphorous is used as a deoxidant during alloying, to prevent the formation of oxide films at grain boundaries. The absence of such films permits the material to be used at its maximum strength and fatigue resistance.

Cooperation. Revere Technical Advisors will gladly work with your engineers and designers in determining the best ways to use phosphor bronzes. Such collaboration may at times be extremely valuable, since some of the factors involved in correct design may seem illogical. For example, contact pressure depends upon thickness, not temper. Increasing the temper does not increase pressure, but permits larger deflection without permanent set, and so does decreased thickness. Careful balancing of temper and thickness are essential for best results. Revere really knows phosphor bronzes, and it will pay you to write Revere when considering their use.

TYPICAL APPLICATIONS

Fuse Clips — Contacts — Radio Trimmers — Springs — Diaphragms — Pressure Plates — Bellows — Flexible Hose — Latches — Relay Parts — Bearing Plates — Sliders — Electric Lamp and Radio Tube Sockets — Clutch Plates — Thrust Washers — Grease Retainers — Paper Mill, Oil Well, Textile, Leather, Laundry, Pump, Printing, Refrigeration, Marine, Automotive Parts and Machines.



REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, New York

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; New Bedford, Mass.; Rome, N. Y.

Sales Offices in Principal Cities, Distributors Everywhere.

For Precision Hole Location:

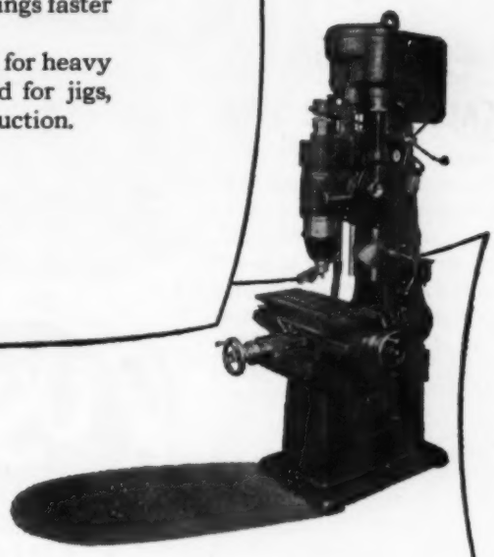
TWO TOOLROOM MUSTS

Spots...Drills...Bores or Reams
All Holes In a Workpiece
With Minimum Tool Changes

With the Moore Jig Borer, there's less stop-and-start to change tools at individual holes for each operation, because no size blocks or end measures are necessary. *Built-in* lead screws, accurate to .0002" over 14" of travel, enable you to make table settings faster than you can change tools.*

Highly sensitive for holes 1/32" diameter, yet rugged for heavy cuts up to 4½", the Moore Jig Borer is ideally suited for jigs, fixtures, dies, machine parts and jig-less, small lot production.

MOORE JIG BORER



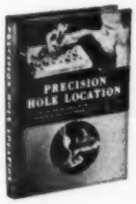
Mechanically Relocates and Finish-Grinds
Holes in Hardened Parts to .0001"
in ⅓ The Time of Other Methods

The Moore Jig Grinder eliminates hours of checking on the bench and surface plate to correct holes in hardened parts. No toolmaker's buttons or locating plugs are necessary, for this unique machine through the use of *built-in* lead screws *mechanically* relocates and finish-grinds straight or tapered holes in ⅓ to ¼ the time required by conventional methods.*

Working to figures instead of to "fit," the Moore Jig Grinder puts die making on an interchangeable parts and assembly basis for the first time. Die, stripper and punch plates can now be produced concurrently with better alignment of mating parts and more uniform clearance between punch and die.

MOORE JIG GRINDER

*Write today for descriptive literature



HAVE YOU BOUGHT YOUR COPY OF "PRECISION HOLE LOCATION"?

Over 5,000 copies of this valuable book on toolmaking practices have been sold to date. Available at special price of $3 in U.S.A.; $3.50 outside U.S.A.—448 pages, over 400 illustrations, 184 pages of Woodworth Coordinate Location Tables from 3 to 100 holes. Send check or money order to Moore Special Tool Co., Inc., Bridgeport 7, Conn.

MOORE TOOLS

MOORE SPECIAL TOOL COMPANY, INC.

738 UNION AVENUE • BRIDGEPORT 7, CONNECTICUT

CALL US FOR STEEL

In our eleven warehouses, conveniently located from coast to coast, we are gradually building our stocks of steel to permit us to do a better job of meeting your requirements for — Stainless, High Strength and Alloy Steels; Hot Rolled and Cold Finished Bars, Structural Shapes, Plates, Sheets, Metalworking Machinery, Industrial Supplies, etc.

So, always remember, when you need steel, telephone, wire or write our warehouse nearest you. You'll get prompt, courteous service at all times.

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UNITED STATES STEEL

YESTERDAY'S PIONEER . . . TODAY'S LEADER

TAPERED END MILLS

CONSTANT SPIRAL

(Die Sinking Cutters)

● To the extensive line of the well known Weldon End Mills have been added Weldon Tapered End Mills, Constant Spiral. Also known as Die Sinking Cutters, these new end mills, filling a definite need, come in a wide range of sizes, giving a choice of many lengths and diameters. Weldon Tapered End Mills as standard stock items are all 3-flute, and offer a choice of ½°, 1°, 2°, 3°, 5° and 7° angles. They represent the same high quality for which Weldon End Mills are famous.

Write for Complete List of Sizes

THE WELDON TOOL CO. Cleveland 4, Ohio
3000 WOODHILL ROAD

THE BELT METHOD IS THE BETTER METHOD
. . . AND THE BETTER BELT IS *METALITE*®

Case No. 3*

Machine Builder Jumps Output 400%

Typical of belt-backstand conversion is the discovery that one belt produces finishes previously requiring two or more finer grades of set-up wheels. Here, a single #80 Metalite Cloth belt performed in one quarter of the time, an operation formerly performed on a #80 and #120 set-up wheel.

The Operation — grind, polish and finish 1¼" cast-iron pipe posts.

Original Method — #80 and #120 set-up wheels.

Belt-Backstand Method — Hammond #4 Backstand — Behr-Manning #80-X Durabonded Metalite Cloth Belt 4" x 14' — Behr-Manning Medium Soft Contact Wheel 12" x 4" x 1½".

Improvement — 1. One operation eliminated.
2. Equipment reduced 52%.
3. Production per man-hour increased 4 to 1.
4. Better and more uniform finish.

Remarks — Operators preferred to work on the belt machine — claimed it to be "less tiresome."

Write or wire or phone us for your own free demonstration of the belt method with better Metalite Cloth belts.

BEHR-MANNING • TROY, N. Y.
(DIVISION OF NORTON CO.)
QUALITY COATED ABRASIVES SINCE 1872

* FOR THE COMPLETE SERIES OF 7 CASE STUDIES WRITE FOR OUR 12-PAGE BOOKLET "PRODUCTION TALKS BACKSTANDS"

ARTER

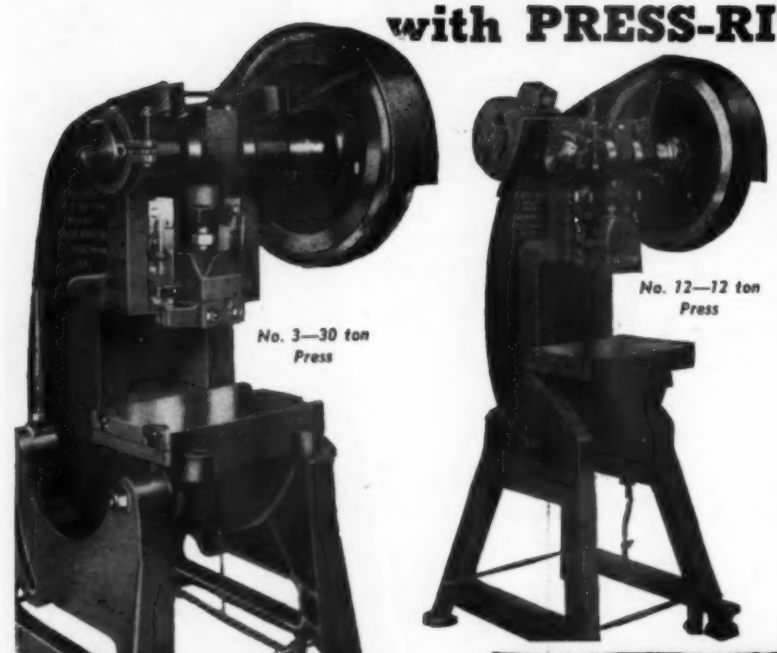
EXACT PARALLELISM
a pre-requisite on grinding piston rings for Diesel engines.

ARTER
Rotary Surface Grinders
are built in several models having capacities from 8" to 40".

ARTER GRINDING MACHINE COMPANY
WORCESTER, MASSACHUSETTS • U. S. A.

Greater Safety at No Extra Cost

with PRESS-RITE PUNCH PRESSES



No. 3—30 ton Press

No. 12—12 ton Press

- **Greater Safety for the OPERATOR**
- **Greater Safety for the DIES**
- **Greater Safety for the PRESS**

With the addition of the new No. 12 12 Ton Press and many improvements to the PRESS-RITE PRESS line, no greater combination of features has ever been offered that will provide such great safety to the operator . . . dies . . . and press. And you get this safety without added cost!

Already known for performance that increases production, and lowers operating costs, the PRESS-RITE Presses now include such outstanding advantages as

1. Built-in single stroke non-repeat mechanism with new 4 point contact steel clutch.
2. New patented automatic cam operated brake.
3. Anti-friction roller bearings in flywheel.

PLUS large die clearances, frame reenforcements, triple lubrication of ram ways, and many others.

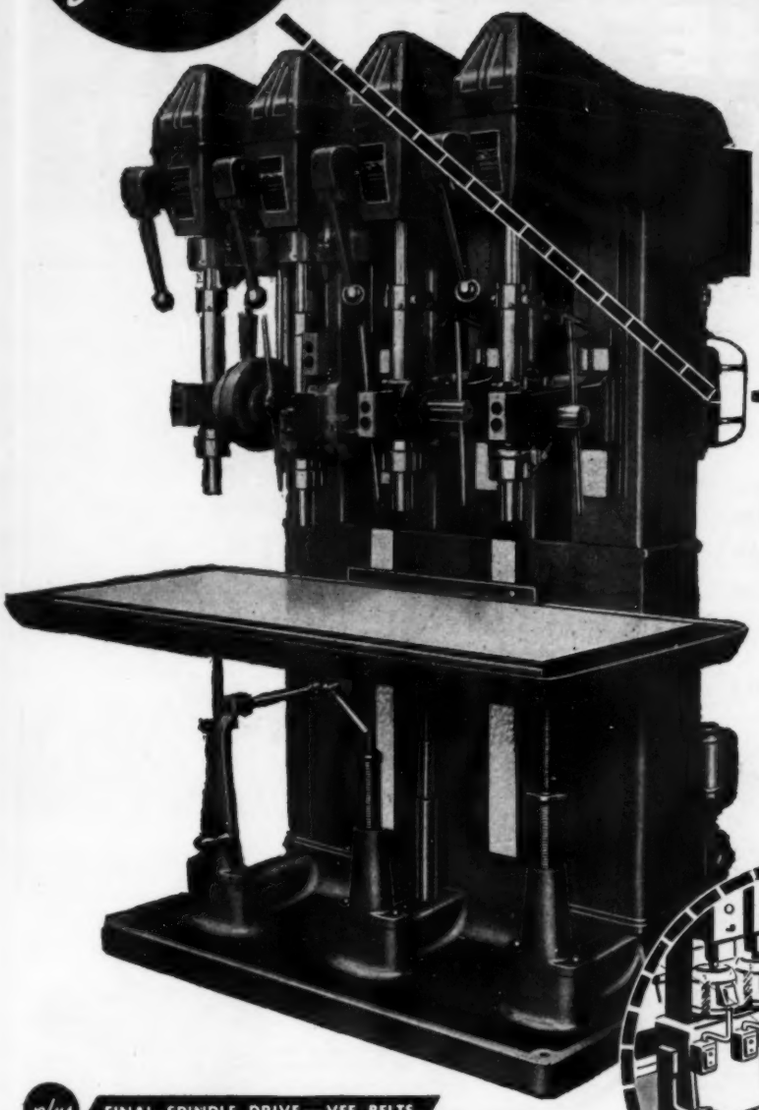
Investigate PRESS-RITE PRESSES today. Six models from 5 to 30 Ton capacity give you increased production . . . lower costs . . . plus GREATER SAFETY!

See your local dealer or write Dept. 138 today.

Sales Service Machine Tool Co.
2363 UNIVERSITY AVE ST. PAUL 4 MINNESOTA

Avey's PLUS features add up to TOP PRODUCTION

Each spindle of AVEY BMA-6 is individually motor-driven by standard frame constant speed motor. Foot-mounted motor easily interchanged or replaced. Standard motors can be stocked.



AVEY TYPE BMA-6

Four Spindle—12" Overhang

1st spindle—Avey-matic feed
2nd spindle—Plain power feed
3rd spindle—Hand feed
4th spindle—Tapping (reversing motor)

Single to six spindle machines, equipped with hand feed, power feed or reversing motor tapping.

plus FINAL SPINDLE DRIVE—VEE BELTS

Vee belt used on final drive from gear box to spindle. Increases speed and sensitivity in drilling. Carries full horse power from motor to job.

plus SIX SPEED CHANGES

On the AVEY BMA-6 six speed changes are made through selective, sliding gears. This automotive type of gear shift is controlled by a single lever at front of machine. Provides versatility and effective operation.

plus SPEEDS OBTAINED — SLIDING GEARS

Selective, sliding gears of AVEY BMA-6 change speeds quickly and easily. Each gear is manufactured and finished by accurate, modern process, shaved, hardened and lapped. Insures smooth operation and long performance.

Avey DRILLING MACHINES
CINCINNATI, OHIO

CLIP AND MAIL TODAY

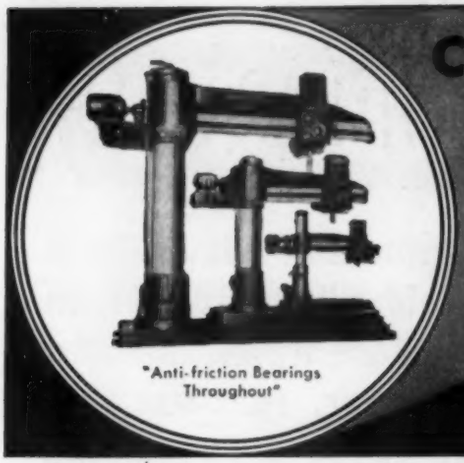
AVEY DRILLING MACHINE CO.,
CINCINNATI 1, OHIO

Gentlemen: Please send without obligation your new Bulletin 647.

COMPANY_____

ADDRESS_____

NAME_____



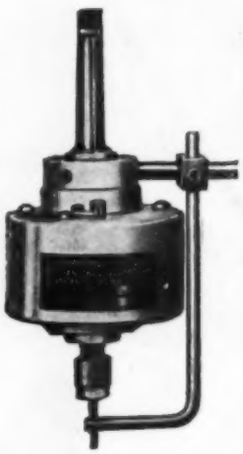
CARLTON RADIAL DRILL

FEATURES: 1. Low Hung Drive to Spindle. 2. All Power Driven Parts Running in Oil. 3. Quiet Running at all Speeds. 4. Concentrated and Convenient Push-button Controls. 5. Constructed on Unit Principle.

THE CARLTON MACHINE TOOL COMPANY

CINCINNATI 25, OHIO, U. S. A.

CUT SMALL HOLE TAPPING COST



With the *new* and *improved* ERRINGTON "Cushion" Cone High Speed Tapper with the 2:1 reverse.

Ball & Bronze bearing throughout.

Taps to 3/16 in steel, ¼ in cast iron.

Also: Multiple drilling & tapping attachments, auto opening dieheads, clutch tappers to 2" taps.

Send for CATALOG

ERRINGTON MECHANICAL LAB.

Main Office & Wks.: STAPLETON, S. I. 4, N. Y.

Established 1891

BUY U.S. SECURITY BONDS NOW!

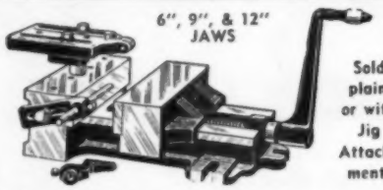
Famous for

- ACCURACY OF THREADS
- LOW CHASER COST
- ALL AROUND DEPENDABILITY

Bulletins available: General Purpose Die Heads, Insert Chaser Die Head, Threading Machines.

See our Advertisement Page 238 Mar. 11, '48 American Machinist

THE EASTERN MACHINE SCREW CORP., 20-40 Barclay St., New Haven, Conn.
Los Angeles: *A. C. Behringer, 554 N. San Pedro St., San Francisco; Guy Reynolds, 454 Vernon St., Oakland,* Canada: *F. Barber Machinery Co., Toronto, Canada.*



Sold plain or with Jig Attachments

Look at the Jobs this Vise will do!

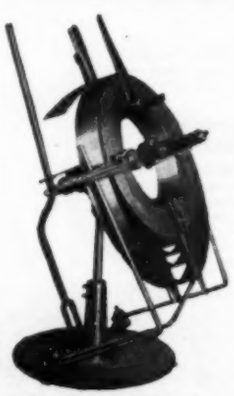
GRAHAM MULTI-PURPOSE VISE

First, a beautifully efficient plain vise, with flush, parallel and square construction, accurately finished. Second, a many-purpose jig or fixture for positioning plain, round and irregular shapes, with stops and guides, for use on planer, shaper, miller, grinder, drill press, radial. Sizes up to 124 lbs.

ASK ABOUT KNURL HOLDER FITTING LATHE TURRET

Request Illustrated Price Circular

GRAHAM MFG. CO. 82 BRIDGE STREET EAST GREENWICH, R. I.



No. 3 Littell Reel. Capacity, 300 lbs.

Reel-Off Coil Stock Faster at Less Cost With LITTELL REELS

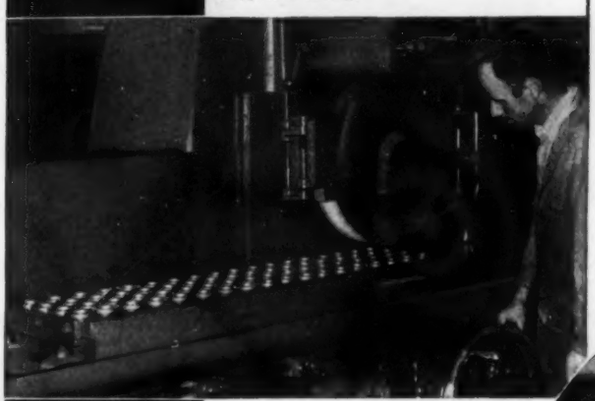
COIL feeding with LITTELL Automatic Centering Reels increases production, lessens waste, improves quality, loads easier. Littell Reels are made in plain or motor-driven types for handling coils 100 to 20,000 lbs. Littell also makes Roll Feeds, Straighteners, Safety Feeders, etc.

Send for Bulletins

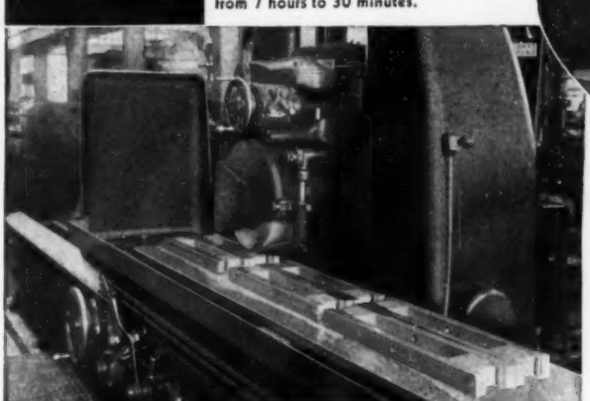
F. J. LITTELL MACHINE CO.
4169 Ravenswood Ave.
Chicago 13, Ill.

LARGE TABLE SPACE MEANS MORE PIECES PER LOAD AND GREATER PRODUCTION *with the Mattison Grinder*

● Cross Slide Draw Bars formerly ground 5 pieces at a time. Now ground on a Mattison Grinder 27 pieces per load. 50% time saving.



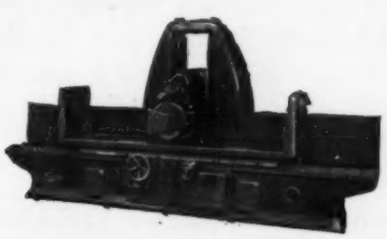
● Caps previously ground few at a time on small grinder. Now, Mattison Grinder handles 75 at a time. Time was reduced from 7 hours to 30 minutes.

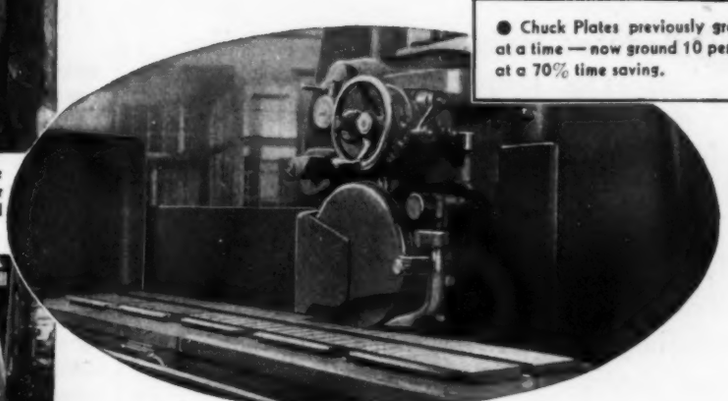


● Head Slide Guides formerly ground one at a time in 36 minutes — Now ground on a Mattison Grinder 9 pieces per set-up at a 77% time saving.

Examples: Grinding 75 pieces per load instead of 18 — cut time 80% . . . . . 10 pieces per load instead of 2 — cut time 70%, etc.

Jobs shown indicate the possibilities for increased production by handling large quantities per set-up. In your efforts to obtain maximum production and lower cost, it will pay you to check into the capabilities of the Mattison Grinder.





● Chuck Plates previously ground 1 at a time — now ground 10 per set-up at a 70% time saving.

ADDITIONAL INFORMATION

Also available is free Set-Up Book showing further examples of work ground on Mattison Grinders — Send for a copy today.

MATTISON MACHINE WORKS

ROCKFORD · ILLINOIS

KORFUND Vibration Control

Helps you 4 Ways

1. **Steps Up Production**—Often permits increased machine speeds—makes economical work-flow grouping of machines practical regardless of impact or vibration characteristics.

2. **Cuts Scrap Rate**—Isolation of impact and reciprocating machinery reduces work spoilage, prevents "chattering" and "bouncing" on work in process. Also protects precision tools against external vibration.

3. **Boosts Employee Efficiency**—Through relief from fatigue caused by vibration.

4. **Reduces Maintenance Costs**—Machines last longer; buildings last longer.

Korfund Vibro-Isolators are efficient, easy to install and adjust, and long-lived. They are sold on a "satisfaction guaranteed" basis.

Because Korfund utilizes all three isolation media—steel springs, cork, and rubber—recommendations are impartial—you get the medium or combination best suited for the job. And Korfund recommendations, whether for standard Vibro-Isolator Units or a specially-engineered installation, are backed by 45 years of experience.

"Vibration in Industry," a 12-page illustrated booklet now available, makes good profitable reading. We'll be glad to send you a copy.

KORFUND VIBRATION CONTROL

The **KORFUND COMPANY, INC.**

48-60 Thirty-Second Place
Long Island City 1, N. Y.

Vibration Control Specialists for Over 45 Years

IT PAYS OUT

EXCEL — NO. 6

UNIVERSAL CUTTER & TOOL GRINDER

For tool and cutter grinding, the No. 6 pays out fast! This machine also performs many other tool-room jobs and is adaptable to cylindrical and internal grinding.

Low price, built-in ruggedness, simplicity of controls and time saved in set-up, make this machine ideal for smaller shops.

In larger shops, the No. 6 adds a lot of tool maintenance in a small space. It has the capacity to do many jobs that are often being done on bigger, more costly machines.

Write for your free copy of Bulletin A-138

Capacity . . . 8" diameter, 16" between center
Weight (floor model).....775 lbs.

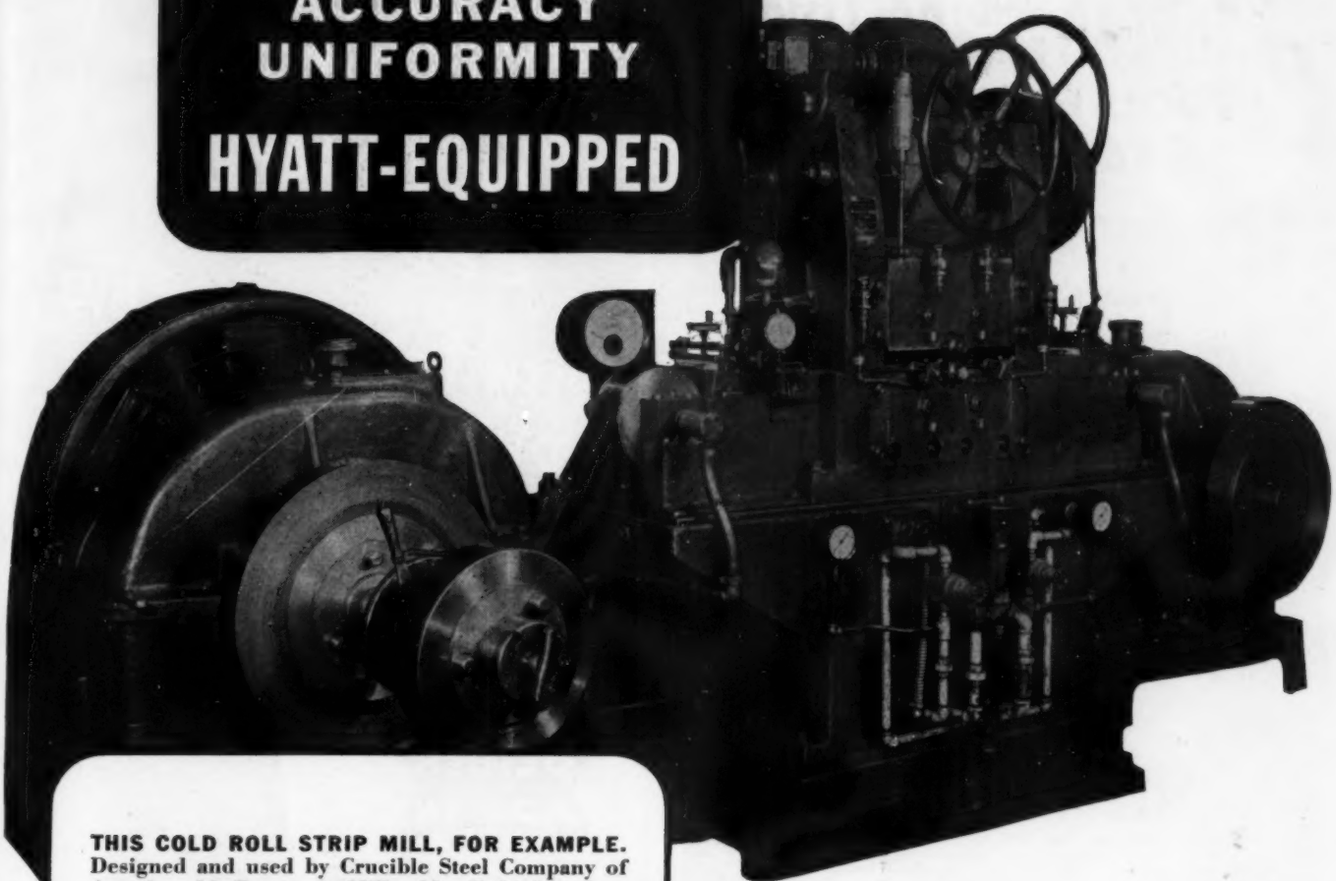
$695.00 Floor model—with motor
Prices F.O.B. Benton Harbor, Mich.

★ EXCEL ★

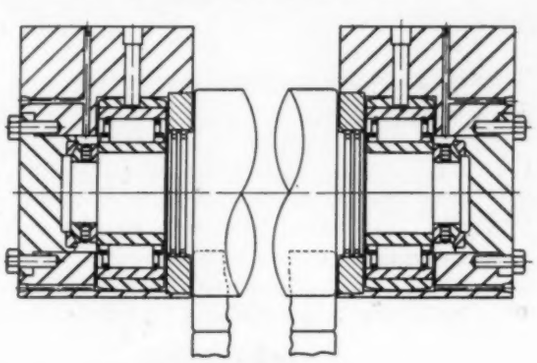
Manufactured by

COVEL MANUFACTURING CO.
BENTON HARBOR MICHIGAN

SPEED ACCURACY UNIFORMITY HYATT-EQUIPPED



THIS COLD ROLL STRIP MILL, FOR EXAMPLE. Designed and used by Crucible Steel Company of America, this Bennewitz Mill cold rolls high carbon steel in coils 3½" wide, to thicknesses as low as .003" with tolerance on thin sizes held to plus or minus .0002". A precision operation, with remarkably high degree of finish and uniformity.



Two Hyatt Hy-Load Roller Bearings are applied to each of the four back up rolls, and provide rigid support for the work rolls. This is the result of the ingenious method of mounting . . . plus important features inherent to the Hyatt Roller Bearings themselves: their high capacity—uniformity of rollers and races—and minimum eccentricity.

From ore to finished product—in steel mills and in every branch of industry—you'll find thousands of successful applications, like this, with Hyatt Roller Bearings contributing to better design and better performance.

Fitting the bearing to the job—not the job to the bearing—is the Hyatt way of engineering. Thus, when Hyatt Roller Bearings are built into a machine, you have the assurance that the bearing is planned, manufactured and applied for your specific requirements. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

HYATT ROLLER BEARINGS

THREAD AND FORM ROLLING TOOLS and MACHINES EXCLUSIVELY!

REED Cam-Actuated, Triple Die THREAD ROLLING MACHINES

REED Cylindrical and Flat THREAD ROLLING DIES

REED KNURLS

REED THREAD ROLLS

A Complete

THREAD ROLLING SERVICE

At your disposal—the skill, experience and equipment of an organization devoted exclusively to the design and manufacture of thread and form rolling tools, machines and accessory equipment. Send us specifications of your work.

RED LABEL DIES
for Reciprocating Thread Rollers

RED LABEL Dies are available for rolling all types of sheet metal and lag screws. Complete stocks of standard dies are on hand at all times. Special dies for any rolling purpose are made up to specifications.

Send for General Bulletin 5-1

REED ROLLED THREAD DIE CO.
Manufacturers of
THREAD ROLLING MACHINES AND DIES—
KNURLS—THREAD ROLLS
WORCESTER 2, MASS., U.S.A.

REED

More holes per grind = less cost per unit

WITH THE OLIVER 510 DRILL POINTER

OLIVER OF ADRIAN

DRILLS LAST 1/3 LONGER

Drills sharpened on the Oliver 510 Drill Pointer are uniformly perfect . . . cut alike. They can be tested where it is most important—on multiple spindle drilling. The "510" gives the only theoretically correct point for mass production drilling — ample evidence that this is the most ***economical*** way of sharpening drills to 3" in diameter.

Give your twist drills the best care for longest life — use the Oliver "510" in your tool room.

FREE OFFER

Send us a few of your drills to sharpen — no obligation — we know you'll be convinced of a marked improvement when you test them on the job.

WRITE FOR "510" CATALOG

OLIVER INSTRUMENT COMPANY
1414 E. Maumee Avenue, Adrian, Michigan

IMPROVE YOUR TOOLROOM IT'S THE BACKBONE OF PRODUCTION

OLIVER OF ADRIAN

AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS—DRILL POINT THINNERS—TEMPLATE TOOL GRINDERS—FACE MILL GRINDERS—DIEMAKING MACHINES

STUDS....

and the tool to set them

Tool in position over the stud, ready to start the drive. Jaws are open to take the stud.

Start of the drive with tool engaged on the stud. With jaws locked.

Drive complete, stud driven to full depth. Stop collar contacts the work, releasing the clutch. Lifting the tool opens the jaws.

MODERN SELF-OPENING STUD SETTER

As the action of this tool is positive and automatic, it is conveniently operated in any position with either air or electrically operated portable tools. It is also adapted to use in a drill press where it is possible to drill and tap the holes and set studs in successive operations.

Let Modern Engineers help with your stud setting problems—send for Bulletin M-186

MODERN TOOL WORKS

DIVISION OF

CONSOLIDATED MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK

Goss & DeLeeuw

THE WORLD'S FINEST MULTIPLE SPINDLE

Chucking Machines

GOSS & DE LEEUW MACHINE CO.

KENSINGTON, CONN.

Investigate

THE POSSIBILITIES OF THE NATIONAL KEYSEATING MILLER *on Your Work*

• Shops all over the country are solving difficult keyseating problems by chucking this attachment on their drill presses, radials and horizontal boring mills—and milling keyseats in pieces too large or bulky for convenient handling on keyseating machines.

The "National" goes through the hole once and mills keyseats with parallel sides and parallel with the axis of the bore. It's a big time and money saver and is available in standard stock diameters from ½" to 3½" for cutting lengths from 1⅞" to 12". It will keyseat in blind holes, and offset holes. We also manufacture oil-grooving millers.

WRITE today for Catalog No. 16

Several widths of cutters can be used with each size miller and many different hole diameters keyseated with one tool through the use of eccentric bushings.

NATIONAL MACHINE TOOL CO.

CINCINNATI 22, OHIO

D. A. Stuart Oil co.

2729 SOUTH TROY STREET, CHICAGO 23, ILL.

STUART *service goes with every barrel*

BAUMBACH *The DIE SET AUTHORITY*

All Baumbach Die Sets have demountable Leader Pins and Bushings. This exclusive feature permits removing Leader pins for machine work on the die shoe and assures reassembly without loss of alignment. A big time and trouble saver. Write for Catalog.

E. A. BAUMBACH MFG. CO., 1804 S. Kilbourn Ave., Chicago 23, Ill.

STRAIGHT SIDE SINGLE CRANK PRESSES

for heavy blanking and forming

Heavier classes of blanking and forming work can be handled efficiently and economicaly on these presses.

Sturdily constructed with either solid frame or built up with tie rods. Small elastic deflections do not affect tool alignment. All stresses taken centrally. Made also with wedge adjustment for slide for very close work.

Full details on request.

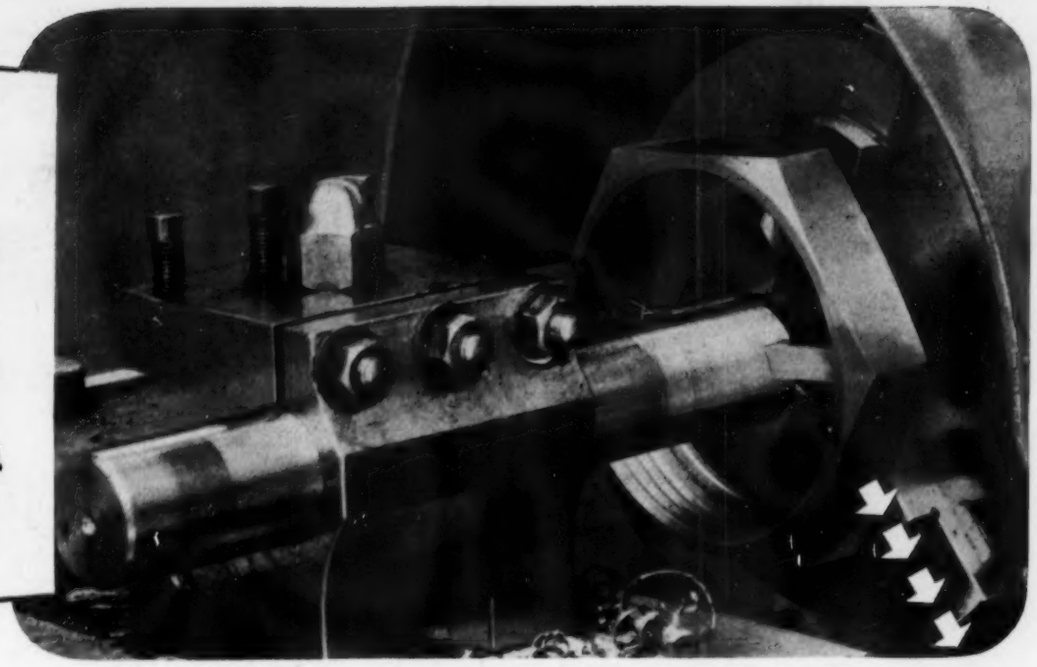
Straight Side Press

ZEH & HAHNEMANN CO.

NEWARK N. J.

180 Vanderpool Street

Cuts
EXTERNAL
INTERNAL
R. & L. HAND
TAPERED
MULTI-START
TRIANGULAR
SQUARE
TRAPEZOIDAL
or ROUND
Threads



IT'S MAKING *threading* HISTORY

ALMOST UNBELIEVABLE versatility, economy, accuracy and threading speeds are achieved with the Cri-Dan Semi-Automatic Threading Machine.

Think of the advantage in your own threading operations of a single point threading machine that (a) cuts threads at sensational speeds of up to 100 passes per minute, (b) controls thread size or pitch to one-thousandth of an inch, (c) provides automatic indexing up to 12 start threads, (d) cuts up to 20° tapered threads, (e) enables speedy, 15 minute changeover to completely new assignments.

Nor is a mechanical genius required to run the Cri-Dan . . . simple adjustments and controls assure the production of perfectly cut, accurate, high-finish threads by the average worker in your plant. *Write for Bulletin 72-A.*

Sentinel CRI-DAN BUILT

RESULTS LIKE THESE ARE TYPICAL!

(These production figures are for the nut illustrated)

Material	Threading Time	Passes Per min.	Passes Per piece	Feed Per pass	RPM
Steel					
Stainless	28 Sec.	80	30	.004	720
High Carbon	26 Sec.	80	32	.0035	640
Low Carbon	19 Sec.	90	26	.004	810
Cast Iron	18 Sec.	100	26	.004	500
Brass	17 Sec.	90	22	.005	900
Aluminum	15 Sec.	100	22	.0055	1500

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NATIONALLY KNOWN manufacturer has opening for a man with thorough knowledge of polishing and buffing equipment, wheels, compositions, etc. Previous sales experience desirable. Must be free to travel. State age, experience and salary expected. Reply to SW-4749, American Machinist.

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POSITIONS WANTED

MECHANICAL — ELECTRICAL engineer with twenty years experience in designing for mass production. Industrial and consumer products. Experience includes electric and pneumatic power tools, small machine tools, electric appliances and electro-mechanical devices. Executive ability, college graduate, age 44. Seeks position as chief engineer with small to medium size plant. Write PW-4633, American Machinist.

FOREMAN: Twenty-five years' experience on Brown & Sharpe automatic screw machines. Able to design cams and tools for these machines Unusual ability in handling men. PW-4936, American Machinist.

CHIEF ENGINEER of chief designer position wanted. Twenty years diversified experience in the designing and development of industrial, commercial and consumer products. Electric appliances, motor driven hand tools, light industrial equipment, pneumatic tools and precision products. Wide experience in originating and developing new ideas, modernizing existing lines and designing for mass production. Also have handled tool designing and production problems. College graduate, executive ability, age 44. PW-4985, American Machinist.

POSITIONS WANTED

ENGINEER, MECHANICAL, mature, capable of handling all phases of tooling problems, quality control systems. Experienced in factory and mechanical maintenance. Seeks permanence, responsibility and scope. PW-5020, American Machinist.

TOOL ENGINEER with fourteen years experience in all phases of Screw Machine Industry including tooling for single and multiple spindle automatics and for secondary operations, motion study, estimating and cost accounting and with shop and supervisory experience desires responsible position with small progressive organization. Southern New England area preferred but location not paramount. PW-5112, American Machinist.

SELLING OPPORTUNITY WANTED

SALES ENGINEER: 12 years sales and sales engineering for prominent builder precision machine tools seeks position with future in machine or tool sales or process engineering. Southwest or West Coast location preferred. Graduate Mechanical Engineer, age 43. SA-5051, American Machinist.

MANUFACTURERS REPRESENTATIVE firm operating eight salesmen and service department in the Chicago area interested in one additional major machinery line. RA-5121, American Machinist.

BUSINESS OPPORTUNITY

Mechanical Engineer

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before U.S. Patent Office. Validity and infringement investigations and opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine and Rommel, Registered Patent Attorneys. Suite 453, 815-15th Street, N. W., Washington 5, D. C.

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36"x30' LeBlond, Geared Hd. Motor Dr.
32"x28' Bridgeford, Geared Head
32"x16' Bridgeford, Geared Head
18"x8' Davis Q.C.G. 42" centers, equipment
28"x10' Davis Quick Change Gear
26"x18' Bridgeford, Geared Head
24"x36' New Haven, Motor Drive
24"x22' Lodge & Shipley, Geared Head. Motor drive. Chuck & equip.
24"x18' American Q.C.G. Grd. Hd. 11' centers, Taper Attach. Motor Dr. Equipment
24"x12' Putnam, Quick Change Gear
24"x10' LeBlond, Quick Change Gear
20"x11' Schumacher-Boye, Q.C.G.
20"x10' American, Q.C.G. 72" centers
20"x10' Hendey, Q.C.G. motor dr.
20"x8' Lodge & Shipley, Q.C.G. M. Dr. 3/60/220/440 volts. 50" centers
18"x10' American Geared Head
18"x10' Davis, Q.C.G. M. Dr.
18"x8' Lodge & Shipley, geared head
18"x8' Hendey Q.C.G. 49" centers
18"x7' Lehman, Q.C.G. M. Dr.
18"x6' American, Geared Head, MD.
16"x8' Hendey, Q.C.G. M. Drive
16"x6' Lodge & Shipley Geared Head
14"x8' Rockford, Q.C.G. Collets
14"x6' LeBlond, Q.C.G. M. Drive
14"x6' Mulliner-Endlund, M. Drive
14"x6' Hendey, Q.C.G. M. Drive
14"x6' Rockford, Q.C.G. M. Drive
13"x5' South Bend Q.C.G. 30" centers
12"x30" American, Wood Spinning
12"x5' Sidney, Geared Head
12"x5' Hendey, Q.C.G. M. Drive
12"x5' Sebastian Q.C.G. Grd. Hd. 30" Centers, Taper Attach. Motor Dr.
12"x3' Craftsman, Bench, M. Drive
11"x4' Sidney, Q.C.G. Floor Type
11"x4' South Bend Q.C.G. 20" centers
11"x3' South Bend, Q.C.G. M. Drive
10"x24" Logan, Q.C.G. (new) in stock. Motor Driven & Turret Lathes
9"x12" Sundstrand Mfg. Type
9"x15" Porter-Cable Production

TURRET LATHES

Oster #601 Hand Screw Machine 1½" Cap.
Morey No. 2 Geared Head 1" Cap.
Simmons, Microspeed, 1" Cap.
W-Swasey, Univ. No. 4, 1½" Cap.
W-Swasey No. 2A, Univ. 2½" Cap.
W-Swasey No. 3A, Univ. 3½" Cap.
Gisholt No. 4, Univ. 2" Cap.
Bullard 42" Vert. Turret. S.P. Drive
Jones & Lamson No. 3 Univ. Bar Feed, 1½" Cap. Motor Dr. Late Drive

GRINDING MACHINES

Rivett #3 Internal Grinder.
Marschke Dbl. End Motor Grinder. 400 volts, 3 h.p. 12" dia. wheels.
Jones & Lamson Univ. 6x15 Thread Grinder. M. Dr. Late type.
Jones & Lamson Univ. 6x36 Thread Grinder, M. Dr. Late type.
Blanchard No. 16 Rotary Surface Grinder, M. Dr. 30' dia. chuck
Brown & Sharpe No. 2 Auto. Surface Grinder. 6x18, Motor Driven. Excello Spdle.
No. 2 B&S Face Grinder, M. Drive
24" Blount Wet Grinder
Besley Dbl. End Disc, 30" Discs
96" Seybold, Knife Grinder
Gorton Dbl. End, 18" Discs
Pratt-Whitney 14x36 Vert. Surface
Abrasive No. 33 Vert. Surface, Automatic. Motor Drive. Standard Equip.
No. 2 Cinci. Centerless, Motor Dr.
Greenfield No. 12 Internal Hydraulic. Motor Dr. All Ball-Bearing Machine
Cincinnati No. 1½ Univ. Tool & Cutter Grinder. Equipment
Cincinnati No. 2 Univ. Tool & Cutter Grinder. M. Dr. Late type equipment
No. 2 Norton, 10x32 Univ. Tool & Cutter, internal attach. & equipment
No. 70 Heald Internal, Grinds 11" deep.
Oakley #3 Univ. Tool & Cutter
No. 51 Oliver, Drill Pointers, 1½" cap. Motor
No. 1 B&S, 10x24, Univ. Cylindrical
"A" Norton, 10x18 Cylindrical
"A" Norton, 10x72 Cylindrical
Brown & Sharpe No. 10 Cylindrical, 6x18 5 h.p. 3/60/220/440 volts
No. 11 B&S 10x30 Cylindrical
No. 4 B&S Univ. 12x60 Cylindrical
No. 2 Cinci. 6x36 Univ. Cylindrical

MILLING MACHINES

Vernon #0 Hand Mill. M. Driven
Sundstrand #0 Rigidmill. M. Drive
Kent-Owens No. 220 Hydr. Horiz. Mill. Motor Dr. Late Type
Cincinnati No. 2 Univ. Horiz. Mill. Turner Dr. 3/60/220/440 volts
Kempsmith No. 2 Plain Horiz. Mill. Turner Dr. 3/60/220/440 volts
Kempsmith No. 1 Plain Horiz. Mill. Motor Dr. 3/60/220/440 volts
Milwaukee No. 2B Dble. Overarm Pl. Mill. S.P. Dr. Braces & Arbor
Cincinnati No. 3S Univ. Horiz. Mill. Vert. Attach. & M. Dr. Arbor—Equipment.
Cincinnati 18" Mfg. Plain Mill. Horiz. 18"x 5"x6". Belt Driven
Brown & Sharpe No. 12 Production Mill, Motor Drive. Late Type. Coolant
Cincinnati No. 4 Vert. H. P. Mill. Motor Drive. All Geared Feeds & Speeds
Cincinnati No. 5 Horiz. H. P. Mill. Motor Drive. Rect. overarm
Cincinnati No. 3 Horiz. H. P. Mill. Motor Drive. All Geared Feeds & Speeds
Cincinnati No. 3 Dial Type H. S. Vertical Mill. Rotary Table. M. Drive
Brown & Sharpe No. 1Y Pl. Horiz. Mill Coolant system
Becker No. 5C Vertical Mill. Range 42"x12"x 12". Power feeds
Pratt & Whitney Duplex Mill. Turner Dr. 3-60-220 Volts
Milwaukee No. 1½ Pl. Horiz. Dble. Overarm. S.P.D. Braces—Arbor.
Van Norman No. 2 Duplex Mill. Collets & motor. Range—28"x17"x9"

PUNCH PRESSES

Heald No. 49 Single End. Two Head Borematic. Arranged direct current motor drive. Series 200 Spindle Heads. Universal Fixture on hand feed cross slide. Complete coolant system.

Caldwell 200 tons Horiz. Hydr. Wheel Press. 36" dia. cap. 7' 6" Length
Bliss No. 18 O.B.I. 11 tons, 2" stroke M. Dr.
Ferracute No. EG52 Coining Press. 150 tons. Up moving ram. 2¼" Stroke
General Flexible Power Press. 8 tons, M. Dr.
Stiles O.B.I. 14 tons, 1½" stroke.
Michigan O.B.I. Press. 36 tons cap. 2" stroke, 6¾" shut height. M. Dr.
Bliss No. 68C Dble. Action, Gap Frame. Floor Model. Bolster Plate.
Lucas 15 tons Power Arbor Press. M. Dr. Floor model with tables
Hub O.B.I. 15 tons, 2" stroke, M. Dr.
Tompkins & Johnson Power Arbor Press. 3½" Stroke. Cap. 6500# Press
McCall No. 4 O.B.I. 2½" stroke, 25 tons. 5½" shut height. Motor Drive
NEW Johnson O.B.I. Presses. All sizes.

DRILLING MACHINES

1 American 4' triple purpose Radial Dr., M.D. on arm, 12" column
Demco 4-Spindle. Drill No. 2 m.t. M.
Pratt-Whitney 2-Spindle. Profiler. M. Dr.
Barnes 22" Sgle. Spdle. Drill Power feed
Natco No. 12, 20 Spdles. 3/16" Cap.
Fox No. 15, 54 Spdles. No. 1 m.t.
Minster No. 2D, Sgle. Spdle. Upright, compound table, No. 5 m.t., heavy duty. 2½"
Cinci.-Bickford, 5' arm, 13" col. Radial 24 speed gearbox. Motor Drive
Fosdick, 5' arm, 14" col. Radial
Cinci.-Bickford, 6' arm, 15" col. Radial. M. Dr. #5 M. T. Motor Drive

SHAPERS & PLANERS

Pratt-Whitney Vert. Shaper, 6", M. Dr. Rotary Table. Immediate Delivery
Logan 7" Horiz. Shaper, Motor Drive
Machinery Sales 16" Crank Shaper
Gould & Eberhardt 16" Crank Shaper, 12" Swivel Vise
Gould & Eberhardt 24" Crank Shaper. Motor Drive. 3/60/220/440 Volts
American 24" Crank Shaper, Motor Dr. 3/60/220/440 Volts. Turner Drive
New Haven 12" Vertical Shaper
Whitcombe, 24x24x6 Planer
Niles-B-P. Shaper Planer, 20x20x24
Betts, 120"x72"x35' Planer

AUTOMATICS

No. 0 & No. 00 Brown & Sharpe
No. 0 Brown & Sharpe Automatic Cutoff
1—1¼" Cone 4-spindle Automatic M.D. Threading Spindle
1—No. 2 Brown & Sharpe Auto.
No. 2 Brown & Sharpe Automatic

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ENGINE LATHES

10"x20" centers Monarch Model EE Geared Head, m.d. in base, late
10"x24" centers Logan, cone
12"x36" centers Lodge & Shipley G.H., m.d. in base, taper, relieving
13"x30" centers Pratt & Whitney Geared Head Model B., m.d., taper
13"x48" centers Pratt & Whitney G.H. Model B, m.d.
14"x30" centers American Pacemaker, m.d. in base, latest
14"x30" centers Lodge & Shipley G.H. m.d. in base, latest
14"x6' Hendey Geared Head, m.d., taper
14"x6' LeBlond, cone
14"x6' Pratt & Whitney, cone
14"x6' Sidney Geared Head, m.d.
14"x6' Springfield Geared Head, m.d., taper
14"x8' Pratt & Whitney, cone
15"x6' LeBlond Geared Head, m.d., Timken
16"x36" centers Pratt & Whitney Geared Head, m.d., taper
16"x6' Bradford, cone, taper
16"x6' Hendey Geared Head, m.d.
16"x6' Hendey Yoke Head, taper
16"x6' Lodge & Shipley Selective Head, m.d.
16"x6' Monarch Geared Head, m.d.
16"x10' Hendey Yoke Head, taper
17"x6' LeBlond Geared Head, m.d.
18"x52" centers American Geared Head, m.d. in base, taper
18"x5' LeBlond Geared Head, m.d.
18"x7' Hendey Geared Head, m.d., taper
18"x8' Bradford, cone, taper
18"x8' Champion, cone
18"x8' Hendey Geared Head, m.d., taper
18"x8' Lodge & Shipley, cone
18"x8' Whitcomb-Blaisdell Geared Head
18"x10' Cincinnati, cone
19"x10' LeBlond Geared Head, m.d.
20"x8' Cisco, cone
29"x10' Sidney Geared Head, m.d.
21"x18' LeBlond, cone
22"x70" centers Greaves-Klusman Geared Head, taper
22"x8' Lodge & Shipley, cone
23"x12' LeBlond Geared Head, m.d., taper
24"x10' American, cone
24"x10' Greaves-Klusman Geared Head, m.d., taper
24"x10' Hendey Geared Head, m.d.
24"x10' Lodge & Shipley, cone
24"x12' Bridgeford Geared Head, m.d., taper
24"x12' LeBlond, cone
24"x14' Boye & Emmes, cone
24"x20' Lodge & Shipley Selective Head, m.d.
25"x10' LeBlond, cone
30"x12'6" Niles-Bement-Pond, m.d., taper
30"x13'6" Niles-Bement-Pond, m.d.
36"x12' Lehmann Hydratrol Geared Head, m.d., taper, late
36"x21' centers Putnam Geared Head, m.d.
36"x32' centers Putnam Geared Head, m.d.
36"x36'6" Niles H.D., m.d. geared head
50"x204" centers LeBlond H.D. Geared Head, m.d., taper

MANUFACTURING LATHES

No. 4 R. K. LeBlond Boring Lathe, 37' bed, 14'4" boring length, m.d., latest type
No. 9 Heavy LeBlond Multi Cut Lathe, m.d.
3½x36", 3½x80", 4x60", 8x84" LoSwing, m.d.
8x132" LoSwing, m.d., latest
9x12" Sundstrand Mfg., s.p.d.
11"18" centers LeBlond Rapid Production, m.d.
13x24", 13x48", 13x96", 15"x6' Coulter Automatic Threading, m.d.
13"x24" centers LeBlond Rapid Produmtion, m.d. in base, latest
16"x6' Cincinnati Mfg. m.d.
16"x6' LeBlond Rapid Production, m.d.
17"x6', 17"x8' LeBlond Auto Mfg.
21"x8' LeBlond Turret, cone
Niles-Bement-Pond Quartering Machine, m.d., new
Schauer Type NA 2B Speed Lathe, m.d.

HAND MILLING MACHINES

Atlas Model MF Bench Type, m.d.
No. 1 United States, m.d.
No. 6 Whitney m d.
No. 1 Standard, m.d.
No. 2 Productomatic m.d.
No. 3 Garvin, m.d.

THREAD MILLING MACHINES

CT-36 Lees-Bradner, m.d.
CT-54 Lees Bradner, m.d.
Hall Planetary, m.d.
4½x12", 6x14", 6x20", 6x48", 6x80" Pratt & Whitney
10x24" Hanson-Whitney, m.d.

UNIVERSAL MILLING MACHINES

No. 3 Brown & Sharpe, cone
No. 3A Heavy Brown & Sharpe, m.d.
No. 3 Cincinnati Medium Speed Dial, m.d.
No. 3 Kempsmith, cone
No. 4A Brown & Sharpe, m.d.
No. 4 Cincinnati H.P., m.d.
No. 4G LeBlond, s.p.d.

PLAIN MILLING MACHINES

No. 000 Brown & Sharpe, m.d., latest
No. 1M Cincinnati, m.d.
No. 1A Milwaukee, m.d. in base
No. 1½, 2 Cincinnati, cone
No. 2 Cincinnati H.S. Dial Type, m.d., latest
No. 2L Cincinnati, m.d., late
No. 2B Brown & Sharpe, m.d., latest
No. 2HL Milwaukee, m.d., latest
No. 3S Cincinnati, m.d.
No. 3 Van Norman Duplex, s.p.d.
No. 4 Cincinnati Medium Speed Dial, m.d., late
No. 4 Cincinnati H.P., m.d.
No. 4 Ohio, cone
No. 5B Heavy Brown & Sharpe, m.d.
No. 5 H.P. Cincinnati, m.d., rect. overarm
No. 5 H.P. LeBlond, s.p.d.

MANUFACTURING MILLING MACHINES

No. 08 Cincinnati Model EA, m.d., latest
No. 08 Cincinnati Model EA, m.d., with rise and fall latest
No. 00 Sundstrand Hydraulic Feed Rigidmill, m.d.
No. 1-12 Cincinnati Plain Automatic, m.d., latest
No. 1-18 Cincinnati Plain Automatic, m.d., latest
No. 2-18 Cincinnati Plain Automatic, m.d., latest
No. 2-24 Cincinnati Plain Automatic, m.d., latest
No. 33 Kempsmith Mfg., s.p.d.
No. 2 Sundstrand Electromill, m.d., latest
No. 3-24 Cincinnati Plain Hydromatic, m.d., latest
No. 3-36 Cincinnati Duplex Hydromatic, m.d.
No. 34-36 Cincinnati Duplex Hydromatic, m.d., tracer control, latest
No. 4-48 Cincinnati Plain Hydromatic, m.d., latest
No. 56-72 Cincinnati Duplex Hydromatic, m.d., widened, latest
4" Pratt & Whitney Spline, m.d.
18", 24" Cincinnati Plain Automatic, m.d.
24", 48" Cincinnati Duplex Automatic, m.d.
Carter & Hakes Mfg. Type, m.d.
24"x6' Ingersoll Slab, m.d.
30"x36"x12' Ingersoll Slab, m.d.
36"x24"x8' Ingersoll, m.d., 1 rail, 2 side heads

VERTICAL MILLING MACHINES

No. 08 Cincinnati, m.d., latest
No. 2M Cincinnati, m.d.
No. 2, 3, 4 Cincinnati H.P., m.d.
No. 2, 3, 4 Cincinnati High Speed Dial Type, m.d., latest
No. 2, 3 Cincinnati Medium Speed Dial Type, m.d., latest
No. 2H, 4H Milwaukee Dial Type, m.d., latest, dial type
No. 2HL Milwaukee Swiveling Head, m.d., latest, dial type
No. 2K, 3K, 4K Milwaukee, m.d., latest, dial type
No. 2½, 3B Milwaukee, m.d.
No. 3V Toledo, s.p.d.
No. 3V Van Norman, m.d., latest
No. 4 Cincinnati H.P., m.d., feed in knee, latest
No. 5 Jackson, m.d.
No. 5 Reed-Prentice, m.d., late
No. 6 Becker, cone
Cincinnati Hydromatic Vertical, 2 spindles on rail

PLANERS

P10 Coulter Crank Type Shaper-Planer, m.d.
24"x24"x6' Gray, 1 head, belted m.d.
24"x24"x10' Whitcomb-Blaisdel, belted m.d., 2 heads
30"x30"x10' Gray, belt, 2 heads
30"x30"x14' Gray, belt, 2 heads
32"x32"x16' Gray, belt, 2 heads
36"x36"x10' Cincinnati, 2 rail, 1 side heads, belted m.d.
36"x36"x10' Niles, 2 heads, belt
36"x36"x16' Cincinnati, 4 heads, reversing m.d., p.r.t. box table
36"x36"x18' Niles-Bement-Pond, reversing m.d., 2 heads, box table
36"x36"x20' Cincinnati, 2 heads, belt
36"x36"x20' Gray, 2 heads, belt
38"x38"x20' Gray Spiral Drive, 2 heads, belt
42"x42"x26' Gray, 2 heads, m.d.
48"x48"x12' Cincinnati, 2 heads, reversing m.d.
48"x48"x12' Gray Openside, 1 rail, 1 side head, reversing m.d., box table, p.r.t.
48"x48"x18' Detrick & Harvey, 4 heads, reversing m.d.
48"x48"x28' Cincinnati, 4 heads, box table, reversing m.d.
48"x48"x30' Cincinnati, 4 heads, belted m.d.
48"x48"x32' Niles-Bement-Pond, 4 heads, reversing m.d.
48"x48"x40' Sellers, 2 heads, reversing m.d.
62"x62"x40' Cincinnati, 4 heads, reversing m.d.
66"x60"x40' Niles-Bement-Pond, 4 heads, reversing m.d., p.r.t.
72"x72"x36' Niles, 4 heads, reversing m.d.
96"x72"x18' Pond, 4 heads, belted m.d.

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MElrose 1241
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PRESSES

No. 3 Losbough-Jordan O.B.I.
Ferracute Double Crank, rated 84 tons
Studebaker No. 3P 205 Hydraulic Arbor
Rouselle Model OA, m.d.
No. 20 V & O, m.d.
B45, B33 Metalwood Hydraulic

SAWS

6x6" Peerless, m.d.
Wells Type 8M Metal Band Saw, m.d.
13x13" Peerless Universal Shaping, m.d.
DeWalt Model ME 1 Abrasive Cut-off, m.d.
7½ H.P. Cincinnati Elec. Tool Co. type JCAW, m.d.
No. 3 and 8 Mutter & Barnes Cold
No. 6 Cochran-Bly, belt
No. 138 Espen-Lucas Cold, m.d
Wagner Cold Saws, cap. 7¼" and 9½" round

SHEET METAL MACHINERY

No. 1 Savage, 34" throat, ¼" cap. Nibbler
No. 2 Libert Nibbler, 28" throat
Gray Turret Head Metal Cutter, ¼", 36" throat
Southwark Rotary Metal Cutter, ⅜" cap. 36" throat
120" No. 100 Niagara Heavy Production Folder, m.d., 16 ga.

SLOTTERS

10" Newton, cone
12" Bement-Miles, m.d.
15" Canada, m.d.
48" Niles-Bement-Pond Geared, m.d.

TAPPERS

No. 1 Bakewell Precision, m.d., latest
No. 2 Bakewell Precision, m.d., latest
No. 5 Webster & Perks 5 spindle Vertical Nut, cone
No. 10 Kaufman H.D. Oscillating Pneumatic, m.d., latest

TURRET LATHES AND SCREW MACHINES

No. 1H6 Libby, m.d., latest
No. 1 Cincinnati Acme Semi-Universal, m.d., Timken
No. 1L Gisholt, m.d., Timken, hardened ways, standard and long bed types
No. 1A Warner & Swasey Universal, preselector head, chucking, latest
No. 1A Warner & Swasey, m.d., bar
No. 2 Cincinnati Acme Full Universal, m.d., chucking, latest
No. 2 Cincinnati Acme Full Universal, m.d., long bed type
No. 2B Foster, m.d., chucking
No. 2L Gisholt, m.d., chucking, Timken, hardened ways
No. 2G Morey Ram Type, chucking and bar types
No. 2A Warner & Swasey Universal, bar, m.d.
No. 2A Warner & Swasey, chucking, m.d., Timken
No. 3 Cincinnati Acme Full Universal, m.d., chucking
No. 3 Foster G.H., m.d., bar
No. 3B Foster, m.d., bar
No. 3L Gisholt, m.d., chucking, long bed, Timken
No. 3 Warner & Swasey Universal, bar, m.d., latest
No. 3 Warner & Swasey Universal, chucking
No. 3L Gisholt, m.d., cross sliding turret
No. 3A Warner & Swasey, m.d., chucking, latest
No. 3A Warner & Swasey, m.d., bar and chucking types, older types
No. 4R Cincinnati Acme, m.d., bar
No. 4 Gisholt Universal, m.d., chucking, Timken
No. 4 Warner & Swasey Universal, bar and chucking types, pre-selector head, latest
No. 4 Warner & Swasey Universal, older types
No. 4 Warner & Swasey Plain, cone
No. 4A Warner & Swasey Universal, m.d., chucking, latest
No. 4A Warner & Swasey Universal, m.d., chucking Timken
No. 2 Warner & Swasey All Geared, bar, m.d., latest
No. 5 Bardons & Oliver Universal, chucking, preselector, late
No. 5 Foster All Geared Universal, m.d., chucking, late
No. 5 Warner & Swasey Universal, m.d., bar, preselector, latest
No. 5 Warner & Swasey Universal, m.d., chucking
No. 7 Bardons & Oliver Ram Type, chucking, late
No. 7 Bardons & Oliver, cone, bar
2½x24", 3x36", 3½x32", 4x34" Jones & Lamson Flat Turret, m.d., bar and chucking types
2½" Jones & Lamson Universal Saddle Type, m.d., bar, late
13" Libby Type A, chucking
26" Libby Type C, chucking
20" Acme, cone, bar
24", 28" Gisholt, cone, chucking
No. 5 Woods Tilted Turret, cone

MISCELLANEOUS

Pratt & Whitney "Keller" Machine, model BL-2420
Bear Precision Balancing Machine, model 340-R, m.d.
Gisholt Precision Balancing Machine, m.d.
40" Chip Wringer, Tolhurst, m.d.
Cochran-Bly Filing Machine
Detrick & Harvey 2 spindle Profiler, belt
No. 12M Morey 2 spindle Profiler, m.d.
No. 12 Pratt & Whitney 2 spindle Profiler, belt
No. 11, 11S Cochran-Bly Saw Sharpeners
Wagner Saw Sharpeners, m.d.

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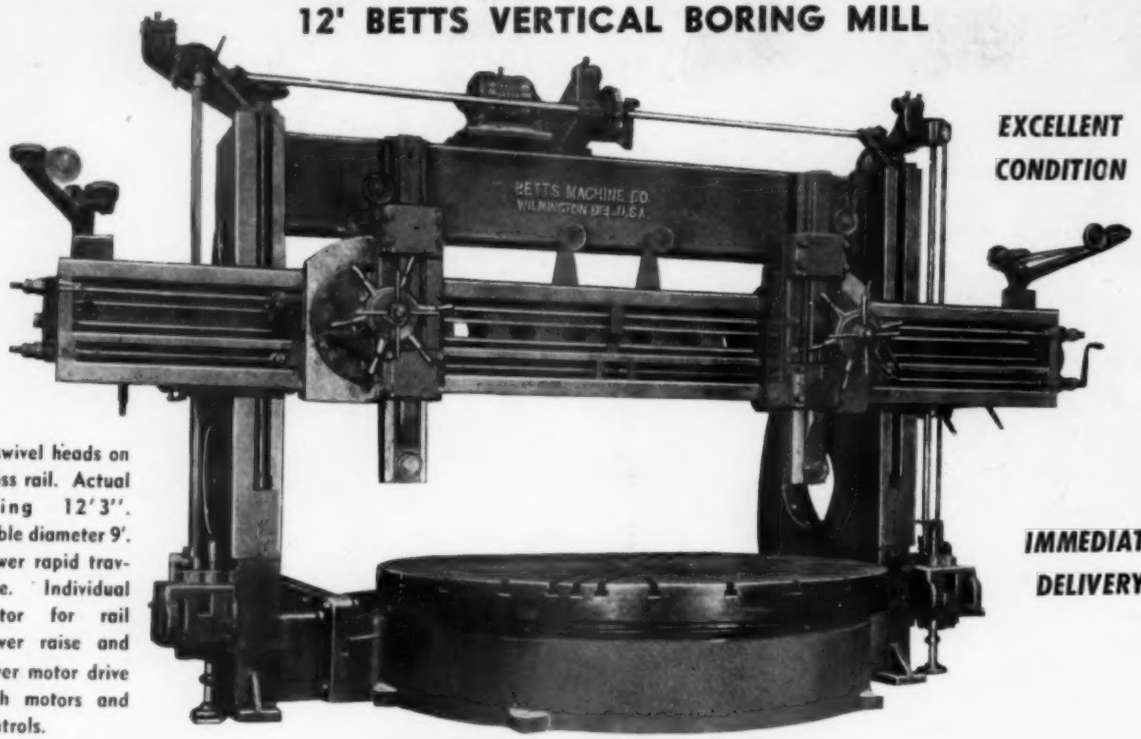
12' BETTS VERTICAL BORING MILL



2 swivel heads on cross rail. Actual swing 12'3". Table diameter 9'. Power rapid traverse. Individual motor for rail power raise and lower motor drive with motors and controls.

EXCELLENT CONDITION

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36" & 42" BULLARD Vert. M.D. Spiral Drive
No. 44 UNIVERSAL "Tri-Way" Table Type
No. 26 DEFIANCE Hor. Table Type, M.D.

CYLINDRICAL GRINDERS
Nos. 1 & 1½ LANDIS Grinders, M.D.
No. 4H LANDIS 4"x18" Plain Grinders
6"x18" NORTON & LANDIS Type C Plain, M.D.
6"x30" NORTON Type C Plain, M.D.
10"x18" LANDIS Type C Plain, M.D.
10"x72" NORTON Type C Plain, M.D.
12"x48" CINCINNATI Model ER Univ. M.D.
14"x36" LANDIS Type C Plain, M.D.
24"x96" NORTON Plain, M.D.

SURFACE GRINDERS
No. 2 REID Surface, M.D.
6"x10"x18" THOMPSON Type F Hyd. M.D.
14"x16"x60" THOMPSON Type C Hyd. M.D.
No. A3—16" Rotary, M.D.
No. 11 BLANCHARD Rotary, 16" chuck, M.D.

GRINDERS (Misc.)
No. 10 B&S Cutter & Tool, M.D.
No. 2 CINCINNATI Cutter & Tool, M.D.
No. 4T SELLERS Tool, M.D.
No. 7243 HEALD Plain Internal, M.D.
9" P&W Hyd. Gear, M.D.
No. 48-C EXCELLO Carbide Tool, M.D.
No. ND-10 HAMMOND Grinder, M.D.

LATHES
AMES Precision Bench Lathe, 1" cap., M.D.
No. 820 LOGAN QCG Lathe, M.D.
14"x30" cc LeBLOND Heavy Duty, M.D.
16"x30" cc MONARCH Model C Toolroom, M.D.
16"x78" cc AMERICAN "PACEMAKER", M.D.
18"x72" cc & 96" cc MONARCH Model BB Engine, M.D.
20"x48" cc MONARCH Model M Engine (2)
50"x17' cc LeBLOND "BIG SWING", M.D.

MILLING MACHINES
No. 2G KEMPSMITH All Geared Univ., M.D.
No. 2 HS CINCINNATI Dial Type Vert., M.D.
No. 2H KEARNEY & TRECKER Vert., M.D.
No. 4MS CINCINNATI Dial Type, Plain M.D. (2)

PRODUCTION MILLERS
No. 08 CINCINNATI Hor. & Vert. M.D.
No. 2-24 CINCINNATI Auto. M.D.
No. 1224 KEARNEY & TRECKER Simplex, M.D.
No. 1848 KEARNEY & TRECKER Simplex, M.D.
No. 12B P&W Two Spindle Profilers, M.D.
No. M50A TAYLOR & FENN Vert., M.D.
No. 45/48 CINCINNATI Plain Hydromatic, Tracer Control
No. 5/60 CINCINNATI Duplex Hydro tracer control mechanism for auto. rise and fall of spindle carriers, M.D.

TURRET LATHES
No. ESM-59 HARDINGE Hand Screw, M.D.
No. 0 B&S Feed Screw, M.D.
No. 2G MOREY Turret Lathe, M.D.
Nos. 3 & 4 GISHOLT Ram Type Univ., M.D.
Nos. 3, 4, & 5 WARNER & SWASEY Ram Type Univ., M.D.
Nos. 3 & 5 JONES & LAMSON Ram Type Univ., M.D.
No. 4A WARNER & SWASEY Saddle Type, Univ., M.D.

DRILLS
No. 263 BARNES Heavy Duty Upright Drill
20" BARNES "Camel Back" Upright Dr'll
Type MA-8 AVEY 4 spdle Floor Type M.D.
6-spdle ALLEN 5 power feed spindles, belted M.D.
3'9" CINCINNATI BICKFORD "Super Service" Radial
3'11" AMERICAN "HOLE WIZARD" Radial, M.D.
No. 3 Type MA-6 AVEY Single Spindle, M.D.

MISCELLANEOUS
LINDBERG Type HYT Tubulaire Hydryzing Furnace
Type B6 PORTER CABLE Belt Sander
36" ROCKFORD Open Side Hydraulic Shaper, side head, M.D.

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No. 4 W & S Turret
No. 6 W & S Turret
No. 0 B & S Wire Feed

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LATEST TYPE NEARLY NEW MACHINES

PRATT & WHITNEY
3B Jig Borer Motor Drive, Latest Type

MODEL 4854

BORING MILLS—Horizontal

CINCINNATI-GILBERT 3½" Bar, Floor Type, Latest
DETRICK & HARVEY 4" bar, Floor Type
GIDDINGS & LEWIS #25, 2½" Bar, M.D.
GIDDINGS & LEWIS #32, 3⅛" bar, M.D.
LANDIS #35, 3½" bar, Floor Type
MORTON 60" traveling hd., combination borer, miller and driller, M.D.
NILES BEMENT POND 4½" bar, M.D.
NILES BEMENT POND 5", 6" bar, floor type, M.D.
UNIVERSAL 3" bar, latest type
UNIVERSAL Model 3A, 3" Bar, M.D.

BORING MILLS—Vertical

BETTS 120" 2 swivel heads, AC, M.D.
BULLARD 16" 6 spindle, 8 spindle, Mult-au-matic, Type D Single Indexing, Latest Type
KING 62" 2 swivel Heads, PRT, M.D.
KING 36" Vertical Turret, M.D., Latest Type
NILES 84" 2 Swivel Heads, PRT, M.D.
NILES 100" 2 Swivel Heads, PRT, M.D.
NILES 72" 2 Swivel Heads, Heavy Duty, PRT, M.D.

BROACHES

LaPOINTE SRV 10-54 Vert. Surf. Hyd., Latest
CINCINNATI 1-30 Duplex Vert. Hyd., Latest
CINCINNATI 3-30 Duplex Vert. Hyd., Latest

DRILLS

AMERICAN 5'13" Plain Triple Purpose Radial, M.D.
BAUSH 4—Adjustable Multiple Spindle—M.D.
CINCINNATI-BICKFORD 6'15" Plain and Universal Radial, M.D.
WESTERN 5'18", 6'20" Radial—Latest Type

GEAR CUTTING EQUIPMENT

BARBER COLMAN #3 Hobber "Precision", Latest
BARBER COLMAN #3 Hob Sharpener, Latest Type
BROWN & SHARPE No. 3H gear cutter, M.D.
FELLOWS 61, #64, 615A, 645A3, 7, 7A, 72, 77, 61A High Speed Gear Shapers, latest type
FELLOWS 12M Involute Measuring Instrument
FELLOWS Type 6Z2 Gear Shaper, High Speed, Latest
FELLOWS #13 LS Lapping Latest Type
GLEASON #20 Spur Gear Tester, Latest Type
GLEASON 3", 12" Straight Bevel Generator, latest
GLEASON #7 Hypoid, Zerol, Spiral Bevel Generator, latest type
GLEASON 11", 18" bevel generator, M.D.
GOULD & EBERHARDT 12HS Hobber, latest
GOULD & EBERHARDT 96H Hobber with DIFF M.D.
PFAUTER #1, #2 with differential, M.D.
PRATT & WHITNEY 10" Grinder, hyd., latest

GRINDERS—Cyl.—Plain & Univ.

BROWN & SHARPE #1, 2, 3, 4 Universal, Latest
BROWN & SHARPE #5 Plain, 3x12, Latest Type
BROWN & SHARPE #20, 10x18 plain, latest type
CINCINNATI 6x18 plain Model EA, hyd., latest
LANDIS 10x24 Type C Univ., Hydraulic, Latest
NORTON 16x72" plain type "C", latest type

GRINDERS—Surface

BLANCHARD #11—16 chuck, Latest Type
BLANCHARD #16—24" chuck, Motor Drive
BLANCHARD No. 16A—Dial Type—M.D.
GALLMEYER & LIVINGSTON #55, 12x36" hyd., latest
HEALD #22, 12" chuck, Rotary, latest type
HEALD 25A, 30" Chuck Rotary Hyd., M.D.
MATTISON 14x24x72 Hydraulic, Latest Type
MATTISON 14x14x60 Hydraulic, latest type
NORTON 6"x18"—Hyd.—Latest Type
THOMPSON 16x30x48 Hyd., Latest Type

JIG BORERS

VERNON "Precision" M.D., Latest Type
PRATT & WHITNEY 1A Motor Drive
REED PRENTICE #5 Vertical Die Sinker Latest

LATHES—Engine and Mfg.

AMERICAN 18x72" centers, Geared, M.D.
AMERICAN 36x360" centers 2 Car., M.D.
BRIDGEFORD 36"x32' bed—2 car., M.D.
JONES & LAMSON "Fay" 20x25" automatic TIMKEN, Latest type
LEBLOND 17"x5', 20"x10' bed, Rapid Production, Timken Bearing, latest type
LeBLOND 25x96" centers, Geared, M.D.
LEHMAN 16x30, hydratrol, Timken, latest type
LODGE & SHIPLEY 36"x144" centers, M.D.
LODGE & SHIPLEY 18"x72" centers, M.D.
LOSWING 4x60, 4x84, 8x60, 8x108, 5x34" centers, latest
MONARCH 12x54" centers Timken, Latest Type
MONARCH 22x456" centers, 3 Car., Timken, Latest
MONARCH 10x20" centers, Model EE Timken, latest
MONARCH 16x28" centers, geared hed., M.D.
MONARCH 12"x36" centers, Timken, Latest Type
NILES 42"x60", double head, M.D.
NILES 48x87' centers, Comb. Boring & Turning, M.D.
NILES 60x10' centers, Timken PRT, Latest Type
NILES 72"x62', centers, combination Boring and Turning, M.D.
NILES 30x50' Boring, Timken, Latest Type
REED PRENTICE 16x24" centers, geared hd., M.D.
SPRINGFIELD 16"x30" centers, Timken, Latest Type
SPRINGFIELD 16x43" centers, geared hd., M.D.
SPRINGFIELD 16x24" centers, geared hd., M.D.
SUNDSTRAND 8x15", stub, auto. TIMKEN, latest
WARD HAGGAS & SMITH 18/36"x10' bed, Gap

LATHES—Turret

BARDONS & OLIVER #5, #7 Timken, latest
CINCINNATI ACME No. 1, Latest Type
GISHOLT #3, 4, 5 Univ., Timken, Latest
GISHOLT #1L, #2L, Universal, Timken, Latest Type
JONES & LAMSON #3, #5, #8A Univ., Timken, Latest
LIBBY 1H-5, 5⅛ hole, Timken, Latest
MOREY No. 2G, No. 3, No. 4 Timken, latest
POTTER & JOHNSTON #5D2E, TIMKEN, latest
WARNER & SWASEY #5, Univ., Timken Bearing
WARNER & SWASEY #1A, Univ., Latest Type
WARNER & SWASEY 2A Univ. Bar and Chuck Latest

MILLING MACHINES—Mfg.

CINCINNATI 24", 48" duplex, TIMKEN, M.D.
INGERSOLL 42x38x12' Planer type, Adjustable rail, 4 heads, AC, M.D.
INGERSOLL 32x30x12' Planer Type Slab, AC, M.D.
INGERSOLL 32x24x16' Planer Type 2 heads, AC, M.D.
SUNDSTRAND Model 3A Duplex, Latest Type
TAYLOR & FENN M-80 Duplex, Spline, latest type

MILLING MACHINES—Plain

BROWN & SHARPE 3B, Timken, Latest
BROWN & SHARPE #12 Timken Bearing, latest
CINCINNATI #4 Timken Bearing, M.D.
CINCINNATI #3, 4, 5, M.D.
CINCINNATI 4-36 Hydromatic, latest type
CINCINNATI 0-8 Automatic rise and fall, Timken, Latest Type
KEARNEY & TRECKER #3, 4 heavy, Timken, latest
KEARNEY & TRECKER 1218, simplex, TIMKEN, latest
KEMPSMITH #4 Maxi-Mill, Timken, latest
SUNDSTRAND #2 Electro-Mill Timken, Latest

MILLING MACHINES—Vertical

CINCINNATI No. 3, No. 4 High-Powered, M.D.
CINCINNATI #2, 3, 4, Dial Type, Timken, latest type
GORTON 9J Super Speed with Duplicator Latest
REED PRENTICE #5 die sinker, latest type
REED PRENTICE 3VG with or without Hydraulic Duplicator, Timken Bearing, latest type

PLANERS

BETTS 96x96x20' 4 Heads, PRT, Box Table, M.D.
CINCINNATI 120x96x26' 4 Heads, Box Table, M.D.
CHANDLER 36x36x20', 4 heads, AC, M.D.
CLEVELAND 48x28x6' Openside 3 heads, M.D.
DETRICK & HARVEY 48x48x16', 4 heads, Hyd.
GRAY 36x36x8', 2 heads, maximum duty, DC, M.D.
NILES BEMENT POND 48x48x16', 4 heads, AC, M.D.
NILES 48x48x12' 3 Heads, DC, M.D.
NILES 54x54x18' 4 Heads Box Table, DC, M.D.
NILES 72x72x25' 4 Heads, Box Table, DC, M.D.

PRESSES

BIRDSBORO 325 ton, vert, hyd., Latest Type
CHAMBERSBURG 50 ton vert, hydro-pneumatic
CHAMBERSBURG 200 ton, horiz. straightening, M.D.
CLEARING Type DS-1125-32 dbl. action 125 ton, Latest Type
FERRACUTE #DG-55, 75 ton drawing, Latest Type
GLEASON 15 ton Quenching, M.D.
HANNIFIN 15 ton moulding, Latest Type
NIAGARA #3 inclinable, M.D.
TAYLOR & FENN #11A spring, Latest Type
TOLEDO #2 inclinable, M.D.
WATSON & STILLMAN 20 ton hyd., sgt., Latest

SCREW MACHINES—Automatic

BROWN & SHARPE #4, 1⅛" capacity, latest type
GOSS & DeLEEUW 8", 5 spindle Chucker, Latest
NATIONAL ACME 9/16, 5 spindle Model D, M.D.

SHAPERS

CINCINNATI 32" Universal Latest Type
GOULD & EBERHARDT 32" Invincible, M.D.
LAMAIRE 18' Vert. Hydraulic—latest type
LYND FARQUHAR 26" Openside, M.D.
MOREY 10", 14" Vertical, latest type
PRATT & WHITNEY 6'10" Vertical, M.D.

MISCELLANEOUS

AJAX 1½", 3½", Belt Heading, Upsetting and Forging
BARNES #172, 306H, 307 Vertical Hone, Latest Type
JONES & LAMSON 6x15", 8x48" thread grinder, latest
MORTON 60" combination traveling hd., planer, miller and borer, M.D.
PRATT & WHITNEY "Keller" Type G, Type BL2416 —Latest Type

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GRINDERS

12"x36" NORTON—Universal—Multi-Purpose—Type C—1941
6"x18" NORTON—Plain Cylindrical—Hydr.—Type C—1941
#2 CINCINNATI—Tool & Cutter—Plain—1942
#2 CINCINNATI—Centerless—"Filmatic"—1942
#2 BROWN & SHARPE—Surface—6"x18"—1943
#A3—12" ARTER—Rotary Surface—12" chuck—1944

LATHES AND TURRETS

14"x30" LODGE & SHIPLEY—12 speed—1942
14"x54" REED PRENTICE—AA—GH—16 spd.—1941
20"x54" REED PRENTICE—AA—GH—16 spd.—1942
13"x5' LEBLOND—Rapid Production—1942
#5—GISHOLT—Universal Turret—Chucking—1943
#3 WARNER & SWASEY—Universal Turret—Chucking—1942
#2 BROWN & SHARPE—Wire Feeds—Hand Screw—Power Fd. to Turret—1942
#2G MOREY—Bar feed or chucking—1942

MILLING MACHINES

#2 BROWN & SHARPE—Plain Horiz. Light Type—1942
#2K K & T Milwaukee—Plain Horiz.—1943
#3H K & T Milwaukee—Plain Horiz.—1942
#3K K & T Milwaukee—Plain Horiz.—1943
#7B FRAY—Vertical Universal—Back Geared—1942 ser.
#MM1-6 U.S.—Multi—Miller—Production—1942
NICHOLS—Hand—motors—pump—1941
#1 UNITED STATES—Hand 220/360—1942

MISCELLANEOUS

#4BM—12" FOSDICK DRILL—2 spindle—1941
#3B STANDARD PRESS—25 Ton—OBI—RL Fd.—1945
#12B PRATT & WHITNEY PROFILER—2 spindle—1941
#00G BROWN & SHARPE SCREW MACHINE—over 17,500

OTHER DESIRABLE EQUIPMENT

BORING MILL—Universal—3" bar—MD
GEAR CUTTER—Henry J. Reuson—#6—72" Spur.
DRILLS—Canedy-Otto—Bench—NEW
GRINDER—Cincinnati—Tool and Cutter—Plain—1935
GRINDER—Norton—Cam—10"x24"—Mtzd.
HOOP FLARER—E. B. Holmes—#20½—Floor Model.
LATHE—Hendey—14"x6'—Geared Head—Factory MD
LATHE—Monarch—14"x8'—Engine—BG—Mtzd. Collets
LATHE—Whitcomb-Blaisdell—20"x5'—QCG—BD
LATHE—Warner & Swasey—Turret—#2—PF to Turret—Arr. MD
MILLING MACHINE—Becker—#5—Vertical—BD
PLANER—Hendey 16"x16"x48"—T & L Pulley Drive
PLANER—Whitcomb—24"x24"x6'—Arr. MD
PRESS—Bliss—50 Ton—OBI
SAW—Cochran-Bly—#4B—Ins. Tooth—MD
SPRING COILER—Sleeper & Hartley—#2
SCREW MACHINE—Brown & Sharpe—#0—Fully Auto.—BD
SCREW MACHINE—Brown & Sharpe—#0G—Ser. No. 7500
SCREW MACHINE—Brown & Sharpe—#00G—Ser. # over 11,000
SCREW MACHINE—Acme—1 spindle—3¼"—Automatic—BD
SHAPER—GOULD & EBERHARDT—24"—4 Spd. Drive
SHAPER—Stockbridge type—16"—Crank—CD
SUPERFINISHER—Foster
WELDER—Pier—Model 82—12-10 KVA

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HEADLINERS

LATHES

14"x6' HENDEY Yoke Head, AC self-cont. drive, univ. relieving attach.
14"x6' AMERICAN 12-speed Grd. Hd. AC MIB, taper
14"x8' AMERICAN 12-speed Grd Hd, AC MD, taper
17"x8' SIDNEY, Lima Drive, taper
18"x6' LODGE & SHIPLEY Selec Grd Hd, AC MD
20"x6' SEBASTIAN Model R, AC MIB, new 1947
20"x10' LODGE & SHIPLEY Selec Grd Hd, AC MD
20"x8' LODGE & SHIPLEY Selec Grd Hd, AC MIB, taper
22"x10' ROCKFORD 3 SCD DBG QC
24"x12' BOYE & EMMES, Turner Drive, AC MD
24"x14' LODGE & SHIPLEY, Turner drive, taper
27"x16' GREAVES-KLUSMAN, 3 SCD DBG, QC

MILLERS

#1 CINCINNATI Univ., 4 SCB BG
#1M CINCINNATI Plain, Rect. O.A., SPD
#2 KEMPSMITH Univ., AC MD, div. hds., vert. hd.
#2 CINCINNATI H.P. Plain, AC MD
#2B BROWN & SHARPE Heavy Plain, AC MD, PRT
#2B MILWAUKEE Plain, DOA, AC MD
#2B MILWAUKEE Univ. DOA, SPD
#2M CINCINNATI Plain, Rect. O.A., AC MIB
#4 CINCINNATI Univ. H.P., Lima Drive
#4B BROWN & SHARPE Plain, AC MIB, DOA
#14 COCHRANE-BLY Univ. Vert. Miller & Shaper, AC MD
#40H INDEX Vert. PF to table, AC MD

SHAPERS & PLANERS

14", 16", 20" & 24" GOULD & EBERHARDT H.D.
24" MILWAUKEE V-ram, Lima AC MD
28" AMERICAN H.D., arr AC MD
30"x30"x8' CINCINNATI, AC MD
36"x36"x8' GRAY Extra Hvy Pat, 3 hds, MD
36"x36"x16' GRAY, 4 hds, AC MD
24"x24"x6' WHITCOMB-BLAISDELL, AC MD

RADIAL DRILLS

2' & 3' AMERICAN Triple Grd, gearbox
3' CINCINNATI-BICKFORD, AC MD
4' MORRIS, MD
6' CINCINNATI-BICKFORD, mtr on arm
7' DRESES, AC MD thru gearbox

GRINDERS

#16—28" & #16—30" BLANCHARD Vert. Spdl. AC MD
#2 BROWN & SHARPE Univ., factory AC MD
#4 GARDNER BB Dies, 23", AC MD, new 1942
#24—33" GARDNER Vert. Spdl Disc. arr MD

TURRET LATHES

#2B FOSTER Univ. Grd Hd, SPD
#3A WARNER & SWASEY Univ., AC MD, Timken
#4 WARNER & SWASEY Univ., AC MIB, Timken
4W CINCINNATI-ACME Univ., AC MD, threading attach.
#5 WARNER & SWASEY Univ., AC MIB

YOUR INQUIRIES SOLICITED

COX MACHINERY CO.,
P. O. Box 1953 — CINCINNATI 1, OHIO
OFFICE AND WAREHOUSE: 311-313 Bakewell St. Covington, Kentucky
Three minutes from the Cincinnati hotel district.

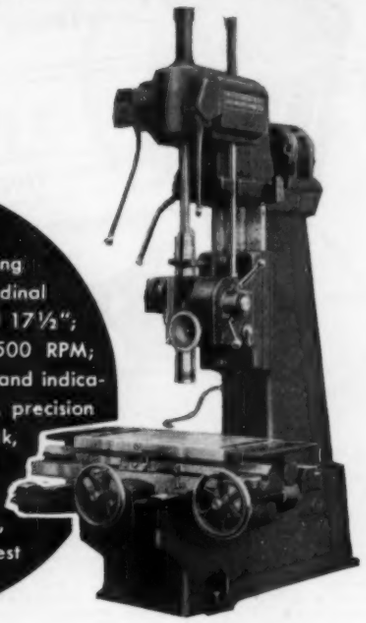
UNUSUAL VALUES

Milling Machines—No. 1, Universal, No. 1 American (new) plain, No. 1 Vertical.
Drills—Large selection, single and multiple spindles also bench types, many of them new.
Gear Cutters—Brown & Sharpe No. 3—26", Gould & Eberhardt 42".
Grinders—Cylinder B & S No. 11, Planer type 16"x36", Surface 13"x63", also new (small) Universal bench and floor type. All with coolant, motorized.
Lathes—14"x6' 8', 10'—16"x6', 8', 10'—18"..6', 8' 10'—26"x16'—all cone drive, several motorized also (new) 18"x8' and 10' geared head, motorized.
Large stock 10" and 12" bench and floor type.
Planers—Single head 24"x6', 24"x8', 26"x8'.
Shapers—16", 20", 24", B.G. crank.
Turret Lathes—J & L 2"x24"—3'x36" also Acme, W & S Turret (vertical) boring and facing mills, 5 hole turrets, 30", 40".
SPECIAL—New totally enclosed dust ,proof, fan cooled, ball bearing saw arbor motors, plain shafts to size or threaded, and with collars, measures only 3¼" from center of shaft to flatted top (1 h.p. to 15 h.p.) 2 or 3 phase, 3600 r.p.m.
WOOD WORKING MACHINERY—A very large stock of new and re-built, practically all motorized. New Motorized overhead cut-off and miter saw for wood, plastics, steel, aluminum and other metals. The above list is only a fraction of our stock which changes almost daily, therefore, tell us definitely what you want since we are adding considerable number of machines to our stock which are too many to list. .What we have today may be sold tomorrow, so a list is really not dependable.
Drill—Foote-Burt No. 25 24" Hi Duty 3" capacity in steel, motor attached.
PATTERN MAKING MACHINERY—42"x 16' bed wood lathe, compound rest, rack and pinion feed to carriage; 16" heavy duty jointer, extra long bed, front table tilts for giving draft to pattern work; tilting abie also tiling arbor rip and cut-off saws; band saws; jointer; floor and bench type trimmers; and also many other machines for pattern work.

THE OSBORNE & SEXTON MACHINERY CO.
P. O. BOX 88, COLUMBUS 16, OHIO

Indianapolis QUALITY MACHINE TOOLS

PARTIAL LIST OF MACHINES NOW IN STOCK



Fosdick Jig Borer, Model 30, Table working surface 18" x 36", longitudinal table travel 30", cross travel 17½"; twelve speeds from 60 to 1500 RPM; equipped with measuring rods and indicators, 16" power rotary table, precision boring head, Jacobs chuck, collets, etc. Motor and control 3 phase 50/60 cycle, 220/440 volt, 1500/1800 RPM. Latest Model.

AUTOMATICS

2G Brown & Sharpe, H.S. 1½" capacity. New, 1943.
9/16" RA-6 Acme-Gridley. New, 1943.
1⅝" 6 Spindle Greenlee. New in 1942.
3½" RA-6 Acme-Gridley. New, 1942.
6" 4 Spindle Conomatic. New, 1942.
★**Bullard Multaumatic, six spindle Model D, single index. Late Model.**

BORING MILLS

No. 42 Lucas Horizontal, 4" bar, with rectangular revolving table, star facing head, motor and control. New, 1942.
★**Universal Horizontal 4" bar, table type, with facing head, rotary table, boring bars, motor and control. New, 1943.**

BROACHES

No. CPC 6-30 LaPointe Hydraulic Vertical. New, 1941.
No. CPC 6-36 LaPointe Hydraulic Vertical. New, 1943.

DRILLS

3' and 4' Dreses Radial, 11" column, enclosed head, 1938 model.
No. H3 Barnes Hydram, 8 speed. New, 1942.
42" Cincinnati-Bickford, single spindle.
KH 2 Allen, 6 spindle. New, 1943.
No. 3 Baush Multiple Spindle.
Barnes Horizontal Deep Hole, two spindle.

GEAR CUTTERS

No. 6 Gleason Gear Tester.
12" Gleason Straight Bevel Gear Generator. Late model.
No. 7A, 7125A Fellows Gear Shapers.
No. 615A, Fellows Gear Shapers.
No. 12 Barber Colman Hobber.

GRINDERS

No. TG615 Jones & Lamson Thread Grinder. New, 1943.
No. 2 & No. 3 Cincinnati Centerless, Filmatic spindle, 1941.
★**14" x 48" Cincinnati Universal, Filmatic bearing, internal spindle. New, 1942.**
No. 3 Brown & Sharpe Universal. New, 1943.
4" x 18" Landis, Type H.
6" x 18" Cincinnati, Filmatic Bearing.
10" x 72" Norton Cylindrical.
10" x 36" Landis Hydraulic. New, 1943.
No. 22 Heald Rotary Surface Grinder. New, 1943.
No. 18 Blanchard, 30" chuck. New, 1942.
16" x 16" x 48" Thompson Model C, Surface.
3B Abrasive, with chuck. New, 1943.
No. 5 Brown & Sharpe Surface. New, 1942.
6" x 12" x 18" Thompson Surface Grinder. New, 1942.
No. 2B Reid Surface, for wet grinding.
No. 16CP16 Bryant Hydraulic Internal Grinder, New, 1942.
No. 75A Heald Internal. New, 1943.
No. 72A3 & 72A5 Heald Internal. New in 1943.

LATHES, ENGINE

Hendey 12" x 30", g.h.
Reed Prentice, 14" x 30" g.h.
Lodge & Shipley Tool Room, 14" x 54", rel. att. New, 1943.
Reed Prentice 14" x 78" Toolroom. New, 1943.
American Pacemaker, 16" x 30". New, 1942.
Reed Prentice 16" x 54". New, 1943.
Sidney 18" x 54". New, 1943.
Lodge & Shipley 20" x 48". New, 1943.
★**Bertram 28" x 240" "Timesaver", two carriages, with rapid traverse. Canadian made from Niles patterns. New, 1942.**
American 30" x 20' g.h.
Lodge & Shipley 48" x 54", cone driven.
Carroll Jamieson 18" x 5', O.D.
South Bend 14½" x 6'. New, 1944.
Lo-Swing, models IMP and R.

LATHES, TURRET

Warner & Swasey No. 4A, with chuck, 7½" hole.
★**Warner & Swasey No. 2A, preselector, Cross sliding turret. New, 1943.**
Warner & Swasey No. 1A, preselector, cross sliding turret. New in 1942.
Jones & Lamson No. 9A. New, 1943.
Gisholt No. 2L, cross sliding turret. New, 1943.
Acme No. 1 Universal, saddle type. New in 1941.
Bardons & Oliver No. 7 Ram Type, Bar feed and tooling. New in 1942.
Foster No. 5 Universal, Bar feed. New, 1943.
Gisholt No. 4 Universal, Hydraulic speed selector.
Warner & Swasey No. 3 Universal. New, 1942.
Bardons & Oliver No. 3 Universal, motor in base. New, 1941.
Warner & Swasey No. 2, oversize. New, 1942.
Bardons & Oliver No. 2, bar feed. New, 1941.
Bullard, 36" Spiral Drive VTL. New, 1943.
Bullard 42" New Era, VTL.

MILLS

★**Cincinnati No. 4 Universal, High Speed Dial Type with rotary table, vertical attachment, slotting attachment, dividing head, motor and control. New, 1942.**
Cincinnati No. 2M Universal.
Brown & Sharpe No. 2A Universal. Late Type.
Brown & Sharpe No. 1 Universal. New 1941.
Kempsmith Maximiller Plain, No. 3.
Brown & Sharpe No. 3B Plain. New, 1943.
Brown & Sharpe No. 2B Plain.
Cincinnati No. 2MH Plain, latest model.
Cincinnati Hydrotel 28" x 60", depth & tracing.
Milwaukee No. 3H Vertical. Latest model.
Milwaukee No. 2K Vertical. New, 1942.
Cincinnati No. 2 Vertical. New, 1940.
Cincinnati No. 08 and 2-18 Rise and Fall.
Cincinnati No. 1-12 Automatic.
Cincinnati No. 3-36 Hydromatic.
Cincinnati No. 34-36 Hydromatic High column with Hydrotel.
DeVlieg Supermill No. 31B.
Brown & Sharpe No. 12. New, 1942.
Whitney Hand Mill, No. 6.

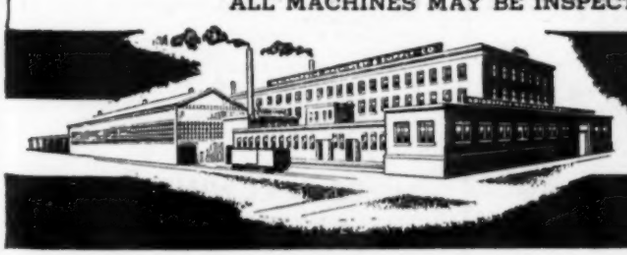
MISCELLANEOUS

Jones & Lamson Comparator.
Cleveland Rigidturner, No. 616.
18' x 18" Marvel Hydraulic Saw.
18" x 18" Racine Hydraulic Saw.
12" x 12" Peerless High Speed Saw.
Bertsch 6' x ⅛" Bending Roll.
No. 26F Norton Hydrolap.
No. 5B Standard OBI Press. New.
No. 8-6 Zeh & Hahneman S. S. Geared Press.
Toledo No. 41 Horn Press.
Tapper, Leland Gifford 3' Radial, No. 3 M.T. New, 1941.
24" Cincinnati Worm Feed Rotary Table.
Dodds Dovetail Machine, 15 spindle.

PLANERS AND SHAPERS

Cincinnati Planer, 42" x 42" x 20', Four heads D.C.
Cincinnati Planer 52" x 36" x 40' four heads, box table. D.C. motor drive.
6" Ammco Bench Shaper.
Cincinnati 24" Shaper, Universal table and power down feed. New, 1943.
Smith & Mills 28" Shaper.
Cochrane & Bly No. 14 Vertical Shaper. New, 1942.
Pratt & Whitney 6" vertical shaper. New, 1943.

ALL MACHINES MAY BE INSPECTED UNDER POWER IN OUR WAREHOUSE



INDIANAPOLIS MACHINERY & SUPPLY CO., INC.
High Quality NEW, USED & REBUILT Machine Tools
1961 S. Meridian St., Indianapolis 6, Indiana
EASTERN BRANCH: 44 WHITEHALL ST., NEW YORK
MEXICO OFFICE HIDALGO ORIENTE 2 535-B MEXICO, D.F.

Most Firms Ask
BOTWINIK *First*

LATHES

Hendey 12", 14", 16" and 18" Tool Room Lathes, M.D. 6', 8' and 10' beds.
1—American 20"x8' Eng. Lathe, QCG, dist. betw. cens. 46", sw. over bed 22½", hole thru spindle 1-11/16", M.D.
1—Pratt & Whitney 20"x48" Model B geared head motor in base engine Lathe; actual swing 21¼" dist. betw. cens. 48" hole thru spdle 2" 16 spdl. speeds.
3—Pratt & Whitney 13"x30" Model B geared head motor-in-base Eng. Lathe, sw. over ways 13⅞" dist. betw. cens. 32" hole thru spdle 1-5/16" 8 spdle speeds 7-440 RPM.
1—Pratt & Whitney 16"x8' single back geared QCG, CONE DRIVEN Eng. Lathe, M.D. taper attmt; sw. over bed 18¾", dist. betw. cen. 36", hole thru spdle 1-11/16", spdle speeds 8, range 7 to 440.

BORING MILLS

1—Yoder #3A Hor. Bor. Mill, diam. of bar 3", Morse Taper #5 dist. to outer support 72", bar trav. 24", latest type, motor driven.
2—Bullard 35" "Spiral Drive", Vert. Bor. Mill face of turret to tbl. 34", clear under cross rail 27⅛", vert. trav. of turret 26⅝", clear under S.H. slide 16", 3 and 4 jaw chuck, approx. wght. 17,500 lbs.
1—Bullard 24", New Era Type; Vert. Bor. Mill capac. 26" diam., 20" high, 28" under turret face, 2 jaw chuck, coolant, M.D. weight approx. 9,000 lbs.

PLANERS

1—American Fndry and Mach. Co. 30"x30"x10', 1 hed. on cross rail, 1 side hed. Openside Planer, M.D.
1—Ohio 24"x24"x6' Planer, single hed on cross rail.

TURRET LATHES

1—W. & S. No. 1A Univ. Hollow Hex. Turret Lathe, hole thru spin. 3⅛", 12 spin. speeds from 20-548 RPM, chuck capac. round stock 2½", length turned max. 33", sw. over carriage 13½", over covers 16¾", complete with bar and chuck equip., excellent condition.
1—W. & S. #5 Univ. Turret Lathe, pre-selector hed., latest type, sw. over bed 20", capac. 2½", arranged for bar.
2—Foster #5 Univ. Ram Type Turret Lathe, latest type, AC motor driven, sw. over bed 17⅛", hole thru spin. 2⅝", bar feed & chuck, equip., consid. extra tooling.

MILLING MACHINES

1—B. & S. #1 ½A Bk. Grd. Constant Speed, Univ. Miller, tbl. wkg. surf. 36¼"x10¾", power feeds long. 24½", cross 7½", vert. 19", AC motor driven.
1—Van Norman #2SU Univ. Mill. Machine, hor. knee type, very latest type, tbl. wkg. surf. 56"x12", feeds long. 24½", cross 10", vert. 17", motor driven.
1—Gorton #8D Vert. Miller power feed to tbl., coolant pump tbl. wkg. surf. 9"x19" feeds: long. 16" cross 10½" vert. 13" 10 spdle speeds 660-6000 RPM, M.D. Serial No. 16336.
Cin. #1-M Pyramid Column Vert. Miller, tbl. wkg. surf. 37"x10½" long. feed 22" cross 12" vert. 16" spdle speeds 12, range 62-1000 RPM.
3—Cin. No. 2M Constant Speed Drive, Pl. Horiz. Millers, tbl. wkg. surf. 48"x10½", range: long. 28", cross 10", vert. 10", 12 spin. speeds, 20-419 RPM.
1—B. & S. No. 2 light type, with vert. hed. Pl. Hor. Miller, latest type, tbl. wkg. surf. 45"x10", all power feeds: long. 28", cross 10", vert. 15", spd. range 30-1200 RPM.
5—B. & S. #12 Pl. Mill. Machine, motor driven, tbl. wkg. surf. 48⅝"x12"; feeds long. 18", cross adj. of spin. 3¼", vert. adj. of spin. hed. 10½"; No. 50 Taper, electrically controlled.

RADIAL DRILLS

1—American 5'13" Full Universal Radial Drill, 24 speeds, motor driven, No. 4 Morse Taper, tumbler gear box, M.D.
Cin. 4'11" col. 5'13" and 6'15" Pl. Radial Drills, 24 Spin. speeds, No. 5 Morse Taper, tumbler gear box, M.D.

CHUCKING MACHINE

3—Potter & Johnson Auto. Chuck. Machine No. 6DRE, sw. over bed way 34", sw. over cross slide 21" diam., total turret slide travel 18", with tooling, M.D.

GRINDER

1—Cin. #2 Centerless Grinder Filmatic Bearing; capac. 1/16" to 3½" diam. Serial No. 2M2HIL-705 latest type, Hyd. truing attmt., thru feed work rest, wheel profile truing device, auto. infeed attmt., infeed work rest; blades and guides and other accessories, practically new, other No. 2 and 3 Cin. Grinders in stock.

WRITE — WIRE OR PHONE YOUR INQUIRIES

Botwinik Brothers of Mass., Inc.
3 SHERMAN ST. • WORCESTER 1, MASS.

AUTOMATICS

⅞", 1¼" & 4½" Cone 4 spindle
1⅞" Conomatic 8 Spindle
1⅝" New Britain No. 61 Six Spindle
2⅝" Acme Gridley 6 spdl. RA6
1⅛" Cleveland 4 Spindle
2"x18" Cleveland, model B
No. 454 New Britain Chucking
14"x19", 16"x33" & 20"x25" Fay
16"—6 station Bullard type D Mult-Au-Matic
8"—6 station Bullard Mult-Au-Matic
No. 2 FU Foster Fastermatic
No. 3D Gisholt Simplimatic
1" type S Economy automatic shaver

GRINDERS, CYLINDRICAL

4"x12", No. 4H Landis hydraulic
6"x18" Norton semi-automatic hydr.
6"x18" Norton type C hydraulic
6"x18" Landis type C hydraulic
6"x18", No. 10 Brown & Sharpe elec. hydr.
Nos. 10 & 11 Brown & Sharpe mechanical
Nos. 1 & 2 Brown & Sharpe universal
No. 13 Brown & Sharpe universal
10"x18" & 10"x50" Norton mechanical
10"x18" Landis Type C hydraulic
10"x24" & 16"x72" Landis mechanical
10"x36", No. 2½ Bath universal
14"x36" Landis type C hydraulic
16"x36" Landis type D semi-auto. hydr.

GRINDERS, SURFACE

16", No. 10 Blanchard rotary
30", No. 16 Blanchard rotary
12" & 16", No. 22 Heald rotary
16" & 24" No. 25A Heald rotary
8" Pratt & Whitney rotary
12" Walker model DA rotary
6"x18", No. 2 Brown & Sharpe
8"x22" Abrasive No. 3
8"x24" Abrasive No. 34 vertical
10"x24" Norton hydraulic
12"x48" Thompson hydraulic
14"x60" Mattison hydraulic
14"x36" Pratt & Whitney vertical

LATHES, TURRET

Nos. 3, 4, 5, 1L & 3AL Gisholt universal
No. 5 Jones & Lamson universal
Nos. 3, 5, 1A & 3A Warner & Swasey universal
No. 2F Foster Fastermatic
No. 5 Foster universal
Nos. 2G & 3 Morey universal
Nos. 4 & 4B Midland universal
Nos. 5 & 7 Bardons & Oliver universal
1½" No. 601 DD Oster
3"x36" & 4"x34" J.&L. flat turret
No. 5 Foster, old style
28" Gisholt, old style
Nos. 4, 4 univ. & 6 W.&S. old style

MILLS, BORING

3" No. 3A Universal horizontal
4", No. 42 Lucas horizontal
7" Barrett cylinder boring
53" & 100" NBP vertical

MILLERS, KNEE TYPE

Nos. 2AS, 3B & 4B Milwaukee
No. 3 Cincinnati High Speed Dial
No. 3 Van Norman duplex
No. 12 Garvin
No. 3 Cincinnati universal
Nos. 2M, 2, 3, 4 HP Cincinnati vertical
No. 3V Van Norman vertical
Nos. 2H, 3H & 4H Kearney & Trecker vertical
Fray All Angle vertical
Vernon vert. mill & jig borer
No. 2A Pratt & Whitney jig borer

SHAPERS

6" Pratt & Whitney vertical
12" Whipp
16" Milwaukee
16" Gould & Eberhardt
20" Gemco universal
24" Gould & Eberhardt
24" Columbia universal
24" Gemco universal
28" Gould & Eberhardt Invincible
36" Rockford shaper planer

MILES MACHINERY CO.
SAGINAW, MICH.

GEAR CUTTERS

NEW — H.S. STEEL • FIRST QUALITY

INVOLUTE 1P to 48P } *ALL LISTED*
BEVEL 3P to 24P } *PITCHES*

LESS 50% DISCOUNT

SEND FOR OUR BARGAIN CIRCULAR

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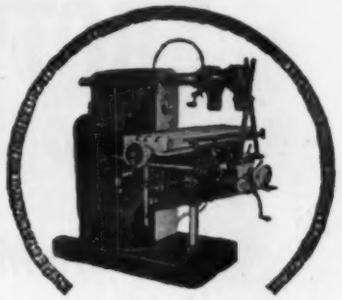

SCARCE LATE MACHINES

Conomatics 6 spdl. 2⅝", 1½" late, fully equipped.
NBP 2500 lb. Single Frame Steam Hammer
Ferracute D.D.G. 56, #105 ton Double Action Cam Press.
Universal 3" boring mill
Gorton Duplicators and Vert. Millers, 8D, 9J
Gorton No. 3Z, Engravers
Marvel 6A Hacksaw, M.D., Auto. Feed
Injection Moulders, Hydraulic Presses
Bakewell No. 1 Tapper
Abrasive 6x18, 8x24 Surface Grinders No. 3B, 34
Conomatic 1⅞" 8 spindle, Late
Brown & Sharpe #5 Grinder Cyl.
Thompson Seam Welder Mod. 26 Rafter, New 1945
W & S Nos. 3, 4 Grd. Hd., Pro-selector
Gisholt No. 5, 2L Univ.
Cinn.-Bickford 3'9" col. Radial
Acme #2 M.D., Foster 3B
Oster 601 Rapiduction, Tooling
Hardinge ESM, 2nd operation
Cincinnati 12x36" Univ. Grinder
No. 18, 25 and 35 Gallmeyer and Livingston Hyd. Surface Grinders, 6x18, 8x24
#25A Heald. M.D., like new Rotary Surf.
B & S No. 2, 2B Surface, M.D.
Norton 6x18" Hyd. Surface. M.D.
Covel #91A Tool, & Cutter
Hammond & Excello Carbide Grind
Gardner #226 Disc
Monarch EE 10"x20" Grinder
Hendey 12x30, G. H. Lathes
South Bend, M.D. 9x3½", 10x48', 13"x5'
Sebastian 12"x4' grd. hd. late
Rivett No. 918 bench M.D.
Hardinge Cabinet
Ledse & Shipley 16"x78" 12 speed Grd. Hd. lathe
Buffalo #0 Angle Roll, M.D.
Excelsior #4 Angle Roll
Bliss #58.OB Gap Presses 62, 62A, 162
Cincinnati 36" Univ. Shaper. Power Downfeed, like new
Burke Miller Pl. & Univ.
Nichols Hand Miller
Delta Single & Multiple Drills
Oliver Heavy die Filer, 510 Drill Pointer
J & L bench comparator 14"
Taylor Winfield 50 KVA Spot Welder
Peerless No. 226, Eyeletting USMC
Hi Speed Hammers, all sizes
Cinn. #3 Pl., #4 Vert. Dial Type, Rect.
B. & S. #12 Elec. Prod. #21
Waterbury-Farrell #30 Thread Roller & Dies
Cinn. Bickford 24" Super Service Radial
V & O 102 Reducing Press
V & O, Z & H 25, 35, 75 Ton OBI
Cinn. 1-12, 2-16 Production Mills
Pratt & Whitney 1 & 2 spindle Profilers
Stokes Tablet Press
Ball & Jewel Plastic Grinders
20"x30' Boye & Emmes Grd. Hd., Late

BORING MILLS

#0 Giddings & Lewis arr. M.D.
2½" Cleveland arr. M.D., 2½", 4" Binsee
Niles-Bement-Pond 4" duplex
66" Niles; 54" Colburn M.D. 2 hds.
Bullard New Era 24", 42", King 42"

Clearing 90-10 Press Brake—10' 10 Ga.
Van Norman No. 36
Cincinn. No. 90-6
Press Brake, ⅜" x 6'

NEW IN STOCK

Power & Gap Shears—52", 72" & 96"

Spot & Arc Welders, 6x6" Racine Hacksaw
5, 7, 14, 18 & 30 ton OBI Power Presses
Ammco 7", Shape Rite 8", Shapers
H.S. Vertical Milling Heads
Drill Presses, Foot Presses
Kalamazoo Metal Band Saws
No. 1½ Abrasive Wet Surface Grinder
6x6" Racine Hacksaw
20 ton Northern Hydraulic Presses

TURRET LATHES

Foster Nos. 4, 5, 6, 1B, 3B, M.D. Univ.
J. & L. 2"x24", 3"x36"

GRINDERS

Surface Grinders, 6x18, 8x24
P. & W. 14", B.B., Vert. Surface 19"x49"
Blanchard 30", M.D.; Modern 12x48" M.D.
Norton Hydraulic 12x18", M.D. Cyl.
Heald No. 72A3 Gagematic
Norton 50"x28' M.D. Roll Grinder
Landis Type A 6x20" Hydraulic, M.D. Cyl.
No. 55, 60, 65 Heald Int., M.D.
12" Heald Rotary, Arter 12" M.D.
B. & S. No. 10, 11, Cyl.; 1, 3 Univ.

LATHES

Hendey 12x30, G.H. Lathes
26x12' Boye & Emmes 3 step cone D.B.G.
14"x6' Hendey Taper, Collets 16"x8'
9" LeBlond P&W 1"x18" Automatic
36x30' Putnam M.D., 36x22', 42x16
32"x35' Wickes, M.D.
Wade, Hjorth, Hardinge, P & W Precision Bench

AUTOMATICS

Cleveland Model A ¾", 1¼", 2"; B 1", 2", ⅞"
Cone 4 spindle, Gridley
Brown & Sharpe #4, 6 Auto., #2 Hand

MISCELLANEOUS

Wiedman Turret Punch—Type R4P
6" Vertical Shaper, P & W
10x10 Peerless Universal Shaping Saw
#7, 72 Fellows Gear Shapers
Pexto 6' Power Shears
Deckel G1, G2, G1F Engraving machine
Hanson Whitney Thread Miller, Planetary
Leland-Gifford 1, 2 & 4 spindles, Model MS

HYDRAULIC EQUIPMENT

2000 TON BIRDSBORO PRESS

Self Contained

60" between rods left to right, 53" front to rear. Overall length of platen left to right 144". Stroke 30". Opening 36". 60 H.P., 3 phase 60 cycle, 220-440 V motor.

1000 TON H.P.M. PRESS Self Contained

Platen 72"x48". 36" stroke. 36" opening 40 H.P., 3 phase, 60 cycle, 220-440 V motor.

500 TON LAKE ERIE PRESS

Platen 35"x36". 36" stroke, 68" opening, 150 H.P., 360-440 V. Motor.

35 TON VERSON PRESS

40x40 platen, 36" stroke, 50" opening, 100 H.P. 3 phase—60 cycle 440 volt.

400 & 500 TON SHAFT STRAIGHTENERS, Self Contained.

All Hydraulic equipment is completely engineered and checked by a competent staff, thus assuring reliability. Send us your hydraulic problems.

MILLING MACHINES

3B K. & T. Dbl. Overarm
Cleveland Vert. No. 1 M.D.; #1 Univ.
#2B K & T Univ.; No. 2A B & S Univ.
No. 3S Cincinnati, S.P.D. rapid trav.
Nos. 0Y, 2, 3, 4, 5 B & S Plain & Univ.
Hall Planetary Model D Thread Miller
Becker Nos. 3, AB, 5, 6 Vert.
Nos. 2, 3, 4 Cincinnati Vert.
P. & W. No. 12, 30" Profiler, M.D.
B. & S. No. 1, 3 Vert.
Taylor-Fenn Spline Miller

RADIALS

Carlton 8' Arm 19" col. M.D.
6' Cincinnati-Bickford
4', 5', 6' American Triple Purpose
Walker-Turner, ½" cap.

AAron Machinery Co., Inc.

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Avey & Allen 3, 4, 5, & 6 Sp.
Barnes No. 201
Cincinnati-Bickford 3', 4', 5', & 6' Radials
Carlton 4' Radial
Niles-Bement-Pond 6' Radial
LeBlond No. 2 Horiz. Rifler Hyd., M.D.

GRINDERS

Abrasive Nos. 33 & 34; No. 3B
Norton 6"x18" Hyd. Surface
Norton 6"x10"x36" Surface
Norton 15"x15"x72" Surface
Hill-Acme 18"x24"x96" Surface
Mattison 12"x16"x54" Surface
B. & S. Nos. 1, 2, 3, Universal
B. & S. Nos. 5, 10, 11, Plain
Bryant Nos. 3B, 5, 6, 12 Internal
Cincinnati No. 1½ Tool & Cutter
Cincinnati No. 2 Univ. Tool & Cutter
Norton No. 2 Tool & Cutter
LeBlond No. 2 Tool & Cutter
Cincinnati No. 2 & No. 3 Centerless
Cincinnati No. 3 Centerless Lapper
Fitchburg 36" Spline Grinder
B. & S. No. 13 Univ. & Tool, Late Type
Blanchard No. 16A & 16—26"
Heald No 25-A Rotary Surface
Heald No. 22—12" Rotary Surface
Heald Nos. 70A & 72A Internal
P. & W. 14" Vert. B.B.
Gardner No. 5 Disc

LATHES

Monarch 12"x30" CK (swings 18")
Hendey Plain 12", 14", 16", 18" Yoke Head
Hendey 14"x6' Y.H. Fact. M.D.
American 16"x6'—G.H.
Amer. 18"x12' M.D. BG Engine
Midland No. 4 Turret
Gisholt No. 3L and No. 5
Bardons & Oliver No. 5 Turret
P. & J. No. 4D Turret

MILLERS

Milw. No. 3B
Cin. #2 Universal
Milw. No. 2B & 3B Double Overarm
B. & S. No. OY Production
B. & S. No. 3A Universal
Cin. Nos. 3, 4 Vert.
Van Norman No. 3 Sp. Plain
Becker Model C Vertical
B. & S. No. 2 Vert.
B. & S. No. 3B & 5B Plain
Kempsmith #2G Plain
Van Norman Duplex #0, #2, #20
P. & W. 8", 10" & 12" Automatic
Cincinnati 18" & 24" Production
Sundstrand No. 1-18 and No. 2 Electromil
P. & W. 6"x14" Thread
Lees-Bradner 6"x36" Thread
Cincinnati #5 M.D. Plain
Kempsmith No. 2G Plain
Milw. No. 1H-12 Mfg.
LeBlond 3H Plain
B. & S. No. 12 Production
Gorton No. 9J Vertical
Kempsmith No. 4 Maximiller, Plain

PRESSES

1000 ton Toledo Knuckle Joint
Toledo 34-P M.D. Punch
Federal No. 5 M.D. O.B.I. Dial
W-F 250-Ton Hobbing
W-F 100-Ton 4 Post Hyd.
Z&H 80-Ton S.S. (New)

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B. & S. No. 00, 0, 2 Automatic 00G
B. & S. No. 1 & 2 Hand Screw
W. & S. Nos. 1, 2, 2A, 3A Universal
Foster No 7 and No. 1B
Cone 1¼", 2", 3¼" & 4" Spindle
Cone 3¼", 3½" & 4¾"—4 Spindle

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IMMEDIATE DELIVERY

60 ton, Dbl. Crank, 5" stroke, 48x24 bed, late model Waterbury Farrel (15).
200 ton 12" stroke, 27x27 bed, Bliss 43'.
#56 Toledo 4" stroke, 21x21 bed, 15½" shut height.
35 ton, 4, 5, 6" stroke, latest type, pract. new, w/all accessories, Bliss $850.00 ea.
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90-125 ton 4½" or 5" stroke, 60, 80, 110 (optional) strokes per min., late Type Inclinable, Walsh, new, 20 to 70 ton, immed. delivery from stock.

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2⅝" RA6 Acme Gridleys
#0G B & S, late type
1" New Brit. Grid., 6 spdl.
1⅜" R4—New Brit. Grid.
1½ Cone—8 spdl. ('39)
9/16 RA6 Acme Grid.
2¼ Cone, 6 Spdl. $6000.00
16" 8 spdl. Bullard Multaumatics, pract. new, $9000.00 ea. (5), with some tooling, dbl. & sgl. index.
12" 8 spdl. Bullards, late type, lots of tooling.

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3" Bar De Vlieg 6' bed, late type
3" Bar Univ. 6' bed, late type

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DRILL, Hyd. No. 15 HC Fox, 24 spdl., #2 m.t.
GEAR HOBBER, 36-H Gould & Eberhardt, m.d.
GEAR SHAPER, #75 Fellows, 6½" helical
GRINDER, Int. No. 72-A5 Heald Hydraulic
GRINDERS, Surf. Nos. 3 & 5 Abrasive
GRINDER, Surf. Rotary No. 25 Heald
HAMMER, Pneumatic, No. 6-B Nazel
LATHES (3) 18"x10' L & S, 12 Speed Grd. Hd.
LATHE, 36"x36' American, 16-speed head
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MILLER, Pl. No. 3, 4 & 5 Cincinnati
MILLER, Thread, No. 40 Lees-Bradner
MILLER, Duplex, 24" Cincinnati
MILLER, Univ. No. 4 Cincinnati
PLANER, Openside, 36"x36"x10' Liberty, 2 hds.
PLANER, Openside, 72"x72"x24' D & H
PLANER, Openside, 108"x96"x24' D & H
PLANER, Hydraulic, 48"x48"x14' Rockford, 4 hds.
PLANER, 72"x72"x12' N-B-P, 4 hds., m.d.
PLANER 120"x120"x30' N-B-P, 4 hds.
PRESS, S.S., Ferracute, S-153, 150 ton, 14" str.
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SHAPERS, 10", 24" and 32", m.d.
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3½" Cincinnati-Gilbert HORIZONTAL BORING MILL, Table Type
#3-L Gisholt Universal Turret Lathe
B4B NATCO 48-spdl. "Holesteel" Drill
#3K Kearney & Trecker Vertical Miller

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BENNETT SPECIALS

42"x18"x16' N.B.P. Frog & Switch Planer, 50 h.p. A.C., M.D.
7' Carlton 17' col. Radial, 1943
3½" bar Cinci. Gilbert Table Type Mill, 84" spin. to outer support, 42" spin. to table, 1943.
36"x32' N.B.P. Lathe, 2 carr., T.A.
Nd. 3K Kearney and Trecker Vertical Miller, 1942
No. 2MH Cincinnati Universal Miller, 1944
No. 3 W. and S. Univ. Turrets, bar, late (3)
20"x144" centers L & S Lathe, Select. Hd.
20"x86" centers Hendey Lathe, T.A., Collets
18'x120" centers Amer. Lathe, T.A., Cone M.D.

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Model 2G—Serial No. 11339—1½" cap.
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No. 2 Brown and Sharpe
No. 61 New Britain 6 spindle 2¼"

DRILLS

No. D-8 Colburn No. 6 Morse Taper
No. 2LMS—26"—2 Spdl. L.G. (1945)
No. 2LMS—26"—4 Spdl. L.G. (1942)
No. 2LMS—14"—4 Spdl. L.G.
No. 2MA6—15"—4 Spdl. Avey
No. 3B—24"—6 Spdl. Edlund (1942)
No. 2—8 Spdl. Leland-Gifford
No. 4 BL Natco—36 Spdls.
7'-15" Col. American Full Universal

GEAR MACHINES

No. 61-A Fellows Gear Shapers (1942)
No. 615-A Fellows Gear Shaper (1942)
No. 712 Fellows Auto Indexing (1943)
11" Gleason Bevel Gear Cutter
72" Cincinnati Gear Cutter

HOR. BOR. MILLS

No. 31 Lucas, 3" bar
No. 3A Universal, 3" bar
Rockford, 3⅛" bar
No. 48-A Heald Borematic

GRINDERS

4"x12" Landis, Model H (1942)
4"x18" Landis Model H (1942)
6"x18" Norton Type C Plain (1943)
6"x30" Norton Type C Plain (1943)
10"x18" Norton Type C Plain (1943)
Norton Motor Driven Plain Grinders
6"x18" —— to —— 24"x240"

12'x36" Landis Type LCH Universal (1945)

No. 5—8"x24" Covel Hydr. Surf (1941)
24"x24"x84" Mattison Hydr. Surf
No. 34 Abrasive Surface (1943)
No. 22—12" Heald Rotary Surface
No. 25A—24" Heald Rotary Surface (1943)

72A-3 Heald Internal Grinder
72A-5 Heald Internal Grinder
No. 5 Bryant Internal Grinder

10"x72" Colonial Broach Grinder

LATHES

14"x6' Hendey
15"x5' Sebastian
16"x54" centers LeBlond
18"x6' American
36"x30' Lodge & Shipley
36'—48"x16' Lehman Hydrotrol (1945)
50"x17' centers LeBlond (1942)

LATHES (Production)

8"x15" Sundstrand, Model B (1942)
8"x15" Sundstrand, Model D (1943)
8"x15" Sundstrand, Model E (1942)
10"x22" Sundstrand, Model AA (1943)
12"x18" Lipe Carbo
16"x33" Fay Automatic (1942)
20"x25" Fay Automatics (1942)

MILLING MACHINES

No. 4 Cincinnati Plain (1943)
No. 2 B & S Univ. Cone Dr.
No. 08 Cincinnati Vert. (1942)
No. 2H Milwaukee Vert. (1942)
No. 2 Cincinnati Vert. (1942)
No. 2M Cincinnati Vert. (1941)
No. 3 Standard Milwaukee Vert.
No. 3 Cincinnati Vert. High Power
24" Cincinnati Production
No. 1-18 Cinn. Mfg. (1940)
No. 2—18" Sundstrand Electromil (1942)
No. M-18 Milwaukee Simplex (1942)
No. M-24 Milwaukee Simplex (1942)
No. 4-48 Cinn. Hyd. Tracer (1942)
No. 45-48 Cinn. Hyd. Plain Tracer (1942)
No. 56-90 Cinn. Hyd. (1943)
No. 2 Hanson-Whitney Thread
4"x8" Hanson-Whitney Univ. Thrd. Miller
4½"x12" Pratt & Whitney, Model C
6"x20" Pratt & Whitney, Model C
6"x36" Lees-Bradner—Model HT (1943)
6"x48" Pratt & Whitney Thrd. Miller
6"x132" Pratt & Whitney Thread Miller
10"x48" Hanson-Whitney Thread Miller (1942)
12"x24" Lees-Bradner, Model HT (1943)
4" Taylor & Fenn Spline, M.D.
No. 15 Ingersoll Trav. Column Face Miller
24"x24"x12' Ingersoll Adj. Rail
72"x48"x12' Ingersoll Adjustable Rail

MISCELLANEOUS

Model H-7 Micromatic Hydro Honer
Model H-705 Micromatic Hydro Honer
Model 200 Micromatic Hydro Honer
No. 22-C Racine Shear Cut Hack Saw
No. 20 Bliss O.B.I. press
No. 2 V & O O.B.I. press
No. 0 Bakewell Tapper
Baush Tapper

TURRET LATHES

No. 2 B. & S. Screw Machine, Wire Feed
No. 5 Warner & Swaseys (1942)
No. 5 Bardons & Olivers (1942)
No. 5 Foster, A.C. & Bar Feed (1942)
No. 2-A Warner & Swasey
No. 1-H Libby, 6¼ Hole in Spindle (1937)
No. 1-H Libby, Extra Long Bed (1942)
18" Libby, 3½" Hole in Spindle
No. 4A Warner & Swasey, 7½" Hole in Spindle

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34" King
42" Bullard New Era
52" King
72" Cincinnati
72" Niles Extra Heavy
84" Betts

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(2) HEALD INTERNAL GRINDERS, #72-A. Serial Nos. 13939 and 13940. PRICE.....$1,500.00 ea.

(1) GISHOLT No. 4-R SADDLE TYPE TURRET LATHE, Serial No. 2914-37, with 26" 4 Jaw Chuck 9" Hole in Spindle, 4-Way Tool Post. PRICE.....$4,500.00

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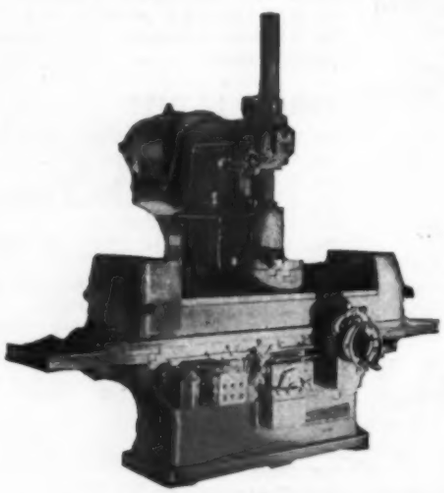

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OTHER FINE MACHINE TOOLS IN STOCK

4' American "Hole Wizard" Radial Drill, '42.
25" Smith & Mills Shaper, Rap. Trav., '42.
20" Smith & Mills Univ. Shaper, Power Down Feed, '42.
36"x36"x14' Cincinnati "Hypro" Planer.
3—#2G B&S High Speed Automatics, mtr. in base.
16"x54" c.c. Lodge & Shipley lathe, mtr. in base.
#8 Sundstrand stub lathe, '42.
#2H Kearney & Tracker Vert. Mill, '42.
#4 Cincinnati Plain Mill, Rect. Arm.
4—#2M Cincinnati Plain Millers, Timken, mtr. in base.
3—#000 B&S Production Mills, '42.
#3B Abrasive Surface Grinder, '42.
12"x36" Norton "C" Univ. Cyl. Grinder, '41.
14"x40" B&S #3 Univ. Cyl. Grinder, '42.
6"x30" Norton "C" Plain Cyl. Grinder, '42.
#22 Heald, 12" rotary Grinder, '42.

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3—Ingersoll Slab Millers, planer type, all with 20 ft. tables, largest has 42" width by 30" height between housing, Power—20 H.P., 3-P-60-C motor.

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3—Sprague Dynameters units, capacity 135-A, 250V., but with 50% overload, included are indicating Wattmeters, reading in KW and H.P., with rheostats, switch boards, etc.

1—Sprague Dynameter unit, capacity 277-A, 250 volts, with 50% overload.

1—Rockford Horizontal Boring and Reaming Machine.

1—Niagara Rotary Shear, 5" cutter.

1—Presses Seven Foot Radial Drill Press.

1—Modern External Cylindrical Grinder capacity 12" diameter by 24" between centers, excellent condition.

3—Carlton 36" Radial Drills.

1—#6 Fellows Gear Shaper for timing gears and other gears connected with gas engine.

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CENTERLESS GRINDERS

No. 3 Cincinnati Filmatic. (Never used.) with motors 3/60/220-440 V. Has Extra Attachments.

No. 2 Cin. Filmatic, 1942 Model, with motors 3/60/220-440 V. Had Limited Service.

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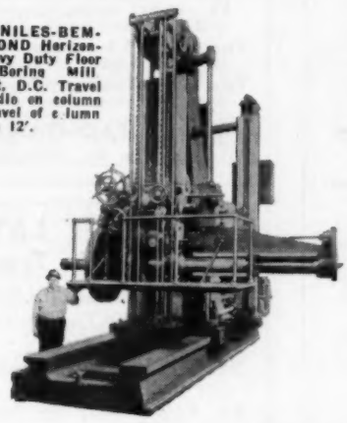
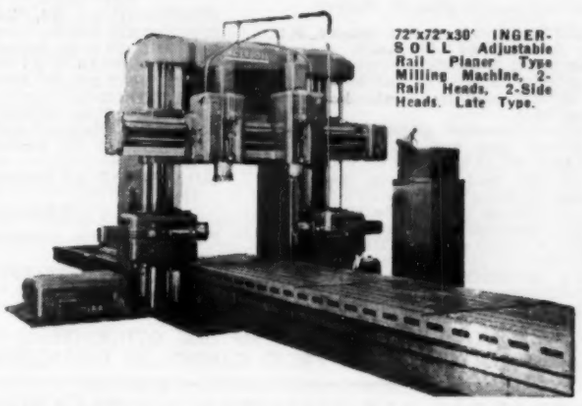
48" and 54" Colburn
84" and 96" Niles-Bement-Pond
10' Betts, Three Heads
10' Niles-Bement-Pond
12' Niles-Bement-Pond
12' Betts, Extra Heavy
4" Bar Lucas Horizontal, Table Type
6" Bar Simmons Horizontal (1943)
2-Spindle, 6" & 3½" Jones Horizontal, Planer Table
5" Bar Sellers Floor Type
10" Bar Sellers, Floor Type

MILLING MACHINES

#3-A and #4-A Brown & Sharpe Universal
#3 and #4 Cincinnati Plain
#3-B and #4-B Kearney & Trecker Plain
#3-Kempsmith Plain
#5 Cincinnati Plain, Rectangular Overarm
#5 De Vlieg Bed Type Horizontal
#2 and #4 Cincinnati Vertical
#5 Reed-Prentice Vertical & Die Sinker
#9 Niles-Bement-Pond Heavy Duty Vertical
24"x24"x16' Ingersoll Heavy Pattern, Planer Type
30"x36"x18' Newton Combination Planer Type and Slab

8" Bar NILES-BEMENT-POND Horizontal Heavy Duty Floor Type Boring Mill 230 volt, D.C. Travel of spindle on column 12'. Travel of column on base 12'.





72"x72"x30' INGERSOLL Adjustable Rail Planer Type Milling Machine, 2-Rail Heads, 2-Side Heads. Late Type.

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18" Height Gauges in Case complete ..... $45.00 ea.

Sets of 11 Pin Reamers #0 to #10, In Wooden Box ..... $7.50 pr. st.

Sets of High Speed Counterbores, from 6/32" to 1" for Allen Cap Screw Sizes: 6/32", 8/32", 10/32", ¼", 5/16", ⅜", 7/16", ½" ⅝", ¾", ⅞", 9/16", 1", 13 Counterbores in Wooden Box, ... $25.00 Set.

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NEW YORK CITY

CANAL 6-5575

FOR SALE

#11 Cochrane-Bly saw and saw sharpener, with 7½ HP 220/440/60 motor, late model good condition $2250.00

#PG-6 Ferracute punch press, geared 1¾" stroke, bed area R to L by F to B 34¾"x 23". Opening in bed R to L by F to B, 16"x14". Slide adjustment. Height overall 103" $2750.00

#2 Cincinnati centerless grinder, filmatic spindle, serial #2M-2HIL-9, late model $2350.00

#5012 Bliss press, 90 ton cap., adjustable ram, 5" stroke $2750.00

#35P Toledo punch press, gap type flywheel 48"x 7", bed size 27"x18", stroke 1¾", 15" from bed to bottom of ram ways. 10 HP motor, Pitman strap and eccentric just rebuilt $1500.00

Hayes electric heat treat furnace, type HG64, with controls, serial #3496 ..... $350.00

U. S. Multimiller, model MM-1-5-2. Table 6"x 2½", automatic vertical motion of spindle head 2" horizontal adjustment of spindle assembly 2¼" motorized, automatic lubrication system, Coolant pump and tank, little used late model machine $750.00

Pratt & Whitney upright shaver, excellent condition model M1257 serial #537 ..... $750.00

Model RA-6 six-spindle Acme-Gridley automatic, 9/16" bar cap., including tooling and equipment, serial No. 2237A, practically new $4550.00

6" Avey stock cutting band saw, late model (exceptional machine) $770.00

Conveyor approximately 100 feet in 8 to 10 ft. lengths ..... $3.50 per ft.

Presses, Waterbury-Farrel tapering, double crank ram adjustment, 4" stroke, with cam gate knockout, 28" flywheel, not motorized, app. 25 ton cap. $400.00

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GRAY PLANERS, (2) 74"x48"x20', 4 heads, DC Motors

SLAB MILL, 24" ROLLER TYPE, 75 HP MOTOR DRIVE, "IXL" Gear Box

EX-CELLO, Model 33, External Precision Thread Grinders, 6"x18" (5)

LEES BRADNER MODEL CT, THREAD MILLERS, 36" centers, 13" spindle

BRIDGEFORD, 14"x15' Axle Turning Lathe

LE BLOND #3 Plain Milling Machine

BROWN & SHARPE, #13-B Manufacturing Mill

FARNHAM, 12' Forming Roll

SWIFT, ELECTRIC WELDER CO. 200 KVA, FLASH WELDER

125 KVA SWIFT SPOT WELDER 24" THROAT

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1 National ½" to 1" Hot Bolt Head Trimmer

Woodward & Powell 42"x42"x36 ft. 4 Head Planer

Cincinnati 36"x36"x16 ft. Planer, M.D.

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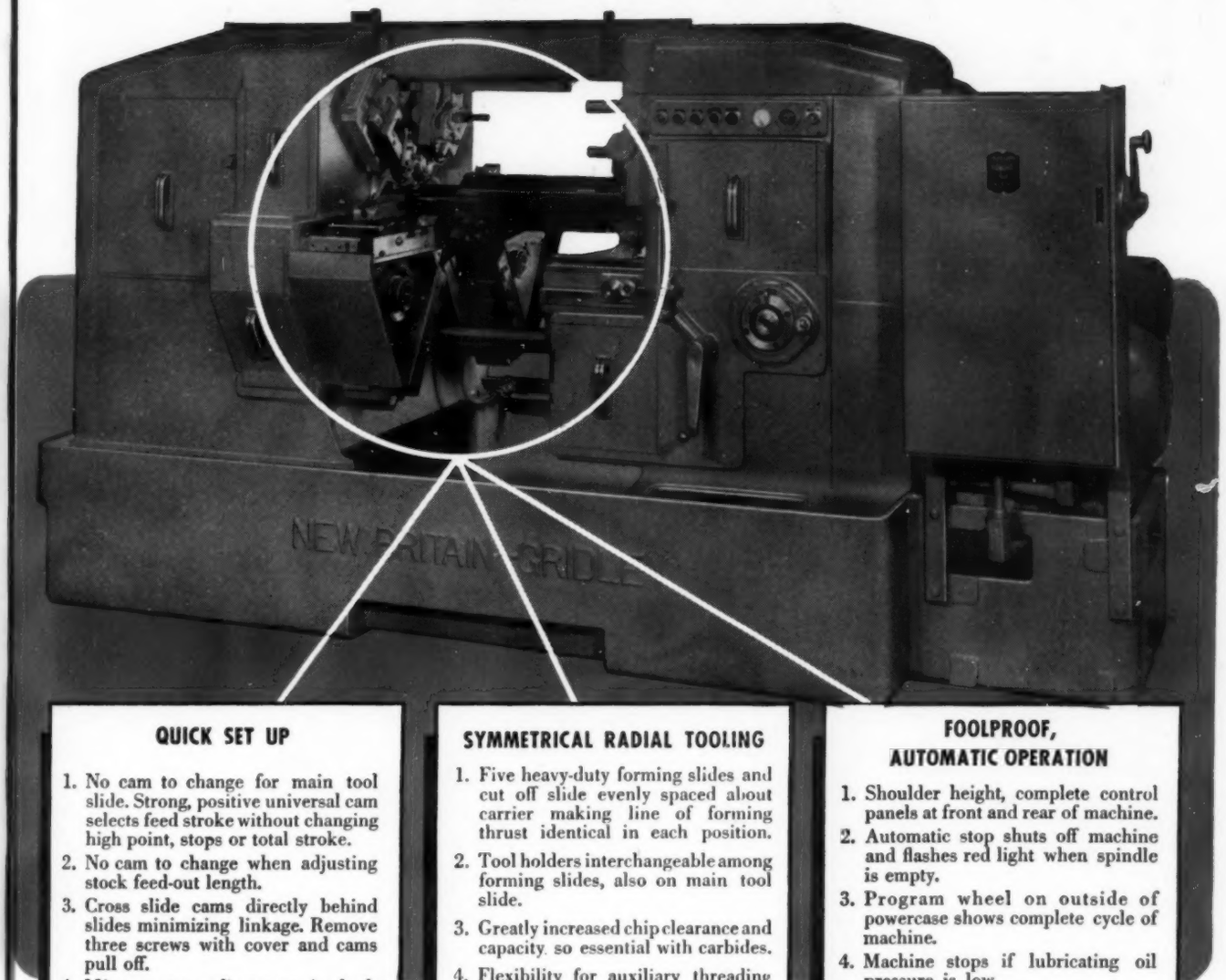
Answers the Need for Lower Costs and Higher Productivity



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1. No cam to change for main tool slide. Strong, positive universal cam selects feed stroke without changing high point, stops or total stroke.
2. No cam to change when adjusting stock feed-out length.
3. Cross slide cams directly behind slides minimizing linkage. Remove three screws with cover and cams pull off.
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1. Five heavy-duty forming slides and cut off slide evenly spaced about carrier making line of forming thrust identical in each position.
2. Tool holders interchangeable among forming slides, also on main tool slide.
3. Greatly increased chip clearance and capacity so essential with carbides.
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1. Shoulder height, complete control panels at front and rear of machine.
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3. Program wheel on outside of powercase shows complete cycle of machine.
4. Machine stops if lubricating oil pressure is low.
5. Gage indicates when machine is operating at other than normal load.

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THE NEW BRITAIN MACHINE CO.

NB

NEW BRITAIN

Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

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TIMKEN® GRAPHITIC TOOL STEELS MACHINE FASTER AND BETTER

ONE OF FIVE BIG REASONS WHY TIMKEN GRAPHITIC TOOL STEELS MAKE BETTER TOOLS, DIES, AND GAGES

BECAUSE Timken graphitic tool steels contain particles of free graphite, they machine faster than other tool steels. Many manufacturers have cut machining time and have gotten better surface finish by switching to Timken graphitic steels!

Besides speeding production, Timken graphitic tool steels help improve product quality. The presence of free graphite and diamond-hard carbides in the structure gives Timken graphitic tool steels a unique ability to retain lubricants and stubborn resistance to wear and abrasion. They also have excellent non-seizing qualities . . . good stability . . . less tendency to scuff and score . . . uniform response to heat treatment.

These features are basic to all Timken graphitic tool steels—Graph-Mo, Graph-Tung, Graph-Al, Graph-Sil, Graph-M.N.S. And each of these analyses has special advantages for particular applications.

Get full details on the many benefits of Timken graphitic steels for tools, dies and gages from your Timken Company representative. And for a free copy of our 48-page, illustrated booklet "Timken Graphitic Tool Steels", which contains valuable information on heat treating and uses, write Steel and Tube Division, The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing.

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